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Editorial Notes.

Standard Specification for Public Lighting under Trial.

We are always prone to look upon specifications for public lighting with some degree of misgiving; the reason being that when a specification is intended for general use, the circumstances to which it has to be applied are so manifold that there is missing the very important factor of definite condition to ensure consistent results. When the standard specification was issued last year, it was received with mixed views—largely favourable, some less so, and some diluted with doubts on detail. We saw this at the annual meeting of the Association of Public Lighting Engineers at Brighton, when Messrs. Jolley, Waldram, and Watson read their paper which expounded the specification. The then incoming President (Mr. J. F. Colquhoun, of Sheffield) was strongly of opinion that the specification was something which required to be put to the proof, in order to test-out its claims and hopes that, if put into operation, a definite advance would be made in the street lighting of the cities and towns of the country. He gained his way, with a result which the members of the Association found very illuminating on their visit to Sheffield for their annual meeting last week. With the approval of his Committee, and the interest of the Department of Industrial and Scientific Research, of the National Physical Laboratory, and of the makers of street lighting apparatus, he made 50 installations for the purpose of demonstrating the specification—not the appliances used. That is an important distinction; and the course taken is a very proper one. The members had an opportunity of inspecting these, and of hearing Mr. Colquhoun's comments arising from his continued study of the trial.

As a result, the President had a few suggestions to make regarding modifications of the specification; but it is merely a case of altering detail to realize the maximum satisfaction. And in the end the specification has strong commendation from him, which is the more valuable in view of the proof to which he has put it. There is material in Mr. Colquhoun's report for those lighting engineers to profit by who are thinking of applying the specification. For example, one of the installations, which has large units of light erected at considerable height and far apart, is inferior in some respects to another installation in the same class which has smaller units closer together, and at a lower mounting height. The minima illuminations in the above are almost identical; but there is a considerable difference in the maxima. The increased maximum illumination with the larger units of light does not add to the visibility in all parts of the street as compared with the visibility of the installation of smaller units, although the carriageway is 9 ft. wider. Another point that has been suggested by the demonstration has regard to the installation of lamps on one side of the street only. The President suggests that perhaps a modification could be made by a clause giving minima mounting heights of the units in one-sided lighting in relation to the width of the carriageway. It is also noted that with low-mounted units there is a great advantage in staggered lighting. There is an increase of the minimum illumination in installation 5 over installation 4 of only 0·004 ft.-candle, but the increase in visibility is considerable—at all events on the carriageway. The advantage of mantles being placed in line rather than in a circle is shown in more than one case. A most interesting experience is found in one installation. The magnification in the refractors used is approximately 12; and with 500-watt lamps the effect of glare was distinctly harmful, and the expressions applied to it have been anything but complimentary. Visibility is distinctly impaired by it; and on that point observers are unanimous. The 500-watt lamps were replaced by 300-watt lamps. The glare was reduced; and there was a marked improvement in the visibility. Another lesson it is interesting to note is that it is possible, with certain fittings, to improve visibility by reducing the size of the lamps used with them. Two other points regarding glare. It is shown by Mr. Colquhoun that glaring lights are not an aid to the distinguishing of colours; and in speaking of other comparative installations, he says one is conscious of glare in one of them, but does not find it discomforting on the roadway, though slightly so on the footpath.

Another lesson which the demonstrations impress is that effective illumination is not always attractive illumination in respect not of the fittings, but of the lighting itself. Comparing, for example, installations Nos. 9 and 21. The former has a minimum illumination of 0·06 ft.-candle; and a maximum illumination of 2 ft.-candles (ratio 1 : 33) Installation 21 has a minimum illumination of 0·1 ft-candle, and a maximum of 0·5 ft.-candle (ratio 1 : 5). But installation 9 (gas) gives one a feeling of brightness and cheerfulness; while installation 21 (electric) is to the President dull, flat, and uninteresting. The minimum illumination of 0·1 ft.-candle is a fair index of the usefulness of the installation from the point of view of visibility; and it is said that objects can be seen on the roadway to practically infinity. The President holds that installations equal in minimum illumination are equal in effectiveness; but if they differ in maximum illumination, they differ in attractiveness, and only very slightly in effectiveness.

Does the Sheffield demonstration confirm the specification? The answer is in the affirmative. If the installations are arranged in the order of their minimum illumination, it will be found that they do form themselves into what would be the order of preference from the point of view of effectiveness; but if arranged in the order of maximum illumination, there is again, from the point of view of effectiveness, obvious contradictions. It is also thought that the glare clause might be made mandatory in order to prevent or handicap an installation with a high minimum illumination and considerable glare. Another suggestion is that distance should be changed from "actual" to "effective." These are relatively minor matters; and therefore the President is able to submit that, on the whole, the specification has come through its

test-ordeal very creditably; and, in his opinion, it should be put into operation in every city and town in the country. This verdict on such a trial will be very agreeable to those who had part in the drafting of the specification. But public lighting authorities will note that, if the specification is to be carried out properly, better staffing and equipping will be required than now. Such a public service as lighting ought not to be starved in these days.

The Impracticable Road Reformer.

WHEN laymen commence to interfere with the uses to which roadways are put, they always seem to suffer from a wrong sense of proportion, and an inability to place any relative value upon each public service that is being rendered. We find this in the Roads Protection Bill, which had its first reading in the House of Lords last Wednesday, and was introduced by Lord Montagu of Beaulieu. His Lordship has his eyes fixed on traffic and its interests. Every other point of view is completely obliterated. But of what little importance would traffic *per se* be if all the residents along a road and its branches were suddenly deprived of gas, water, and electricity through the operations of a crude Bill such as that which Lord Montagu has launched. That traffic is the one and only consideration which has caused the promotion of this Roads Protection Bill is seen by the memorandum which accompanies it. The breaking-up of roads, it is said, has become much more important through the increase of road traffic, which is now so large that any opening of the roads involves considerable congestion of traffic, and seriously reduces the usefulness of the road. We should be prepared to argue that the temporary interference with traffic is a small matter compared with the permanent increased usefulness to the public which the road opening work generally confers. Because of the pipes and wires which have already been laid under the road, it is said the solution of the problem is now a question of some difficulty. But it is the growth of traffic which has brought this about; and Lord Montagu's idea is that the traffic must be sacrosanct, and that the old public services which find accommodation in the subsoil of the roads must be offered as sacrifices on the altar of motor usage. But his Lordship sees no difficulty in dealing with new roads. They are simple enough. All that has to be done is to provide that no pipes or wires must be laid in future. We suppose this means that, at the time the road is made, the engineer must be in a position to lay pipes and cables which will be large enough for all time, and will never decay. Lord Montagu has surely more information of mundane affairs than to believe that such a state of things can be created that change will never be wanted. The responsible engineers do not know even how many connections there will be to their mains and cables when they are laid. The memorandum contains another misconception. It says: "For the last 100 years and more, companies have had "the privilege of laying their pipes free of charge under "the roads." That in effect is wrong. Directly these pipes are in position they become subject to local rating; and the aggregate sum paid represents something that is not a mere bagatelle. What more does the motor-car do than the gas pipe? Both contribute through rates or taxes. However, these wicked public utility companies must have their operations brought under better control. Road traffic must be regarded as paramount. The owners of pipes and wires must in some cases be compelled to remove them either to the verge of the road or to land bordering on the road. So serious has the matter become that something more than piecemeal legislation is needed; the subject must be dealt with on a general basis. We should not mind that, provided it was a basis which recognized the need of every public service and the requirement of accommodation for the distribution of necessaries and commodities. We cannot assent to the proposition that roadways were made for one class of user, and no other. The public who provide the greater part of the money necessary for the maintenance of roads have a right to say that they require them to be put to the maximum public service, and not have a limitation placed upon them as is proposed in this Bill.

Coal Selling in the Overseas Markets.

THE expected will in all probability come to pass. It was clear that part of the British coal areas exporting coal could not carry on a fair competition for overseas business under such conditions as those created by the Five Counties Marketing Scheme, which incorporates means for collecting the wherewithal from home coal consumers to subsidize coal for export with the declared intention of recovering lost trade by undercutting foreign coal producers. It is patent that the foreign buyer will go to the British market which offers him the best terms, and that market will naturally be the one where that coal is subsidized and so the cheapest. Thus everything pointed to the force of circumstances coming into play, and bringing about the fusion of all the exporting areas. We learn that for some time a movement has been under consideration for their co-ordination, and that this will shortly issue in a joint conference. At the conference would be represented the Five Counties Scheme, the Scottish, and the South Wales; and it is thought that, in view of the conditions which those schemes have brought about, the Tyne exporting trade will be represented. It is considered that such a development would be of the first importance to the coal industry. Joint action has already eliminated cutting competition between different collieries in the same district; and the argument is that what applies to collieries may, by consolidation and co-ordination, be made to apply to areas. One coal correspondent writes: "Should one "British coal-marketing scheme emerge, every grade of "coal produced could be offered on a scale of prices which "would be economic, but at the same time competitive. "It might develop a sharp international competition, but "that possibility has received consideration."

Sulphate of Ammonia Position.

WE cannot say that from the gas maker's point of view the annual report of Dr. T. Lewis Bailey, the Chief Inspector of Alkali Works for England and Wales, is a cheerful one; and no compensation is found in that of Mr. J. W. Young for Scotland. It distresses Dr. Bailey to see good ammoniacal liquor being run to waste where the situation of the works admits of this being done without creating a nuisance. So it does most of us, who agree that what the gas manager wants is a method of making a readily saleable ammonia product without the necessity of purchasing an additional intermediate such as sulphuric acid. If Dr. Bailey or someone else in his profession would find the gas industry something of the kind suggested by him, it would be so grateful that the inventor would enjoy good reward.

Our modern difficulties with ammoniacal liquor do not end there. The introduction of vertical retort working has brought about an increase in the percentage of the higher tar acids, and the ammoniacal liquor generally obtained is weak as regards ammonia by reason of the relatively large proportion of undecomposed steam passing forward where steaming of the charge is practised. Dr. Bailey fortifies our hope that in these respects the investigation which is going forward will provide information which will have considerable bearing on the question. The prejudicial influence of weak ammoniacal liquor on the manufacture of sulphate of ammonia has led several works to cut-out the final water scrubbing that is usually employed for completing the extraction of the ammonia from the gas. A thorough cooling of the crude gas by means of water-tube condensers, followed by a scrubbing with weak liquor from the earlier section of the condensers (cooled before use) gives a satisfactorily strong liquor, and need not leave in the gas more than (say) 30 grains of ammonia per 100 c.ft. of gas. This is dealt with in a sulphuric acid catch, the incompletely neutralized liquor from which can go to the saturator of the sulphate plant. This results in more efficient plant running and reduction of the effluent by something like 20 p.ct. Advice is also given regarding the uniform disposal of ammonia effluent, instead of causing trouble by fluctuating deliveries.

In the tabulated statement showing the ammonia products manufactured in 1927 (expressed as sulphate 25$\frac{3}{4}$ p.ct. NH_3), we get an indication of the big influence which

synthetic ammonia is having on the course of the ammonia products market. The figures for gas-works are separately stated; a composite line: "Other works (including coke-ovens, iron-works, producer gas, synthetic, &c.)" is accompanied by figures which now overwhelm those for gas-works. We know that coke-ovens, iron-works, and producer-gas plants have been working far short of their full capacity, and so it is the synthetic plant that is the source of the large addition to supplies. In the gas-works of England and Wales in 1927, 147,162 tons were produced, which (ignoring 1926) is less by 1783 tons than in 1925. On the other hand, the figure accompanying the composite line is for 1927, 252,425 tons, which is more than in 1925 by 50,758 tons. The total output on the basis of sulphate 25¾ p.c. NH_3 in 1927 was 399,587 tons, which was more by 48,975 tons than in 1925. In a note to these figures, Dr. Bailey says that, of the total of ammonia products, the equivalent of 36,667 tons was manufactured as concentrated ammoniacal liquor; the balance of 362,920 tons consisting of other ammonia products (sulphate, chloride, nitrate, &c.). In the report for Scotland, Mr. Young gives the total of salts of ammonia produced in 1927 as 73,858 tons. The report was noticed in last week's issue.

Details in Meter Verification.

THE Association of Statutory Inspectors of Gas Meters is one of those organizations that come into being almost unnoticed, but soon show that they have a part to play in the correct ordering of things. The Statutory Inspectors of Gas Meters brought themselves into existence as a corporate body at a very appropriate time—just when the developments of gas supply were making the industry clamant for meters of normal size, but of larger capacity, so as to deal with greater gas demands without occupying more space. Already in this connection, as in others, the official inspectors are finding out defects in the decrees under which they work. As was seen in the report published last week of the annual meeting in Birmingham, the President (Mr. Cornelius Chambers) states that there is some fear on the part of the Council that, this being a period of change and development in the gas-meter, it is a question whether the requirements as laid down provide adequate safeguards for the new types of meters. Even users would prefer that they should be adequate so as to be assured that the meters are reliable; but we do not want examination carried to an absurd and unnecessary degree, which would only mean waste of time and greater expense.

There is also a point as to new type meters. A question has been raised as to whether, interpreting section 12 of the Sales of Gas Act, 1859, in conjunction with section 19 of the Gas Regulation Act, an inspector is in a position to refuse a meter of a new pattern, or containing new or novel features, until it has been submitted to the Board of Trade, and a certificate issued. The inspectors were rather doubtful about the matter; the Board of Trade are not. Their opinion is that an inspector cannot refuse to accept a meter in these circumstances, and that he is not in a position to say he will not deal with it until he has received a certificate from the Board. That seems the commonsense view. The Acts do not prescribe a design of meter; they define what a meter must be able to do. And if a meter does that, who can submit that it does not deserve to be stamped? The Council, however, consider this is a matter which should be placed before the members, as it would appear that section 19 of the Gas Regulation Act, which was included for a specific purpose, is apparently valueless. The Association evidently do not intend to let the matter rest; for the members asked the Council to consider the advisability of approaching the Board of Trade with the view of obtaining for gas-meter inspectors the same facilities with regard to meters containing novel features as are enjoyed by the weights and measures inspectors. Regarding the test for the absorption of pressure in meters during the course of the registration tests, in accordance with section 22 of the regulations, an interesting point emerges. From the distribution engineer's point of view, the absorption of pressure test is only of secondary importance to the registration test; and its primary intention was to keep down the loss in the increased capacity meters. But what experience has shown is that more meters of the old light rating are rejected under this section than of the high capacity type. Probably the test is in excess of need. Out of the 106,209 meters tested in Birmingham last year, only 164 had to be rejected for excessive absorption of pressure, or approximately 1·5 per 1000. The Act allows a tolerance loss of five-tenths, which in view of the figures we have quoted is ample; but to determine whether meters come within this tolerance at their badged rate, great care is necessary. These are all fair matters for criticism; and the Association are doing right in working for revision and co-ordination of their regulations so as to secure correct and uniform practice.

Useful Tar Data from Mr. Cone.

In compact form, Mr. W. E. Cone, Secretary of the British Road Tar Association, stated the case for the use of tar on roads. This was before the French Tar Producers' and Distillers' Association in Paris on July 2. He took the opportunity of clearing away the misconception that imported asphalt and bitumen have reduced the consumption of tar for road purposes. The available data (as given in the paper) show that it has not. What has happened is that to the extent that asphalt and bitumen are used, they have curtailed the absorption capacity of our roads for home-produced tar, and as we have the tar at home, we have the right to make the protest. And, moreover, the alien substances will try their best to secure a share of the work that must arise from the insistent demand for still better roads. "As road traffic is still increasing in volume and weight, failure of the improvement and reconstruction plan would be," Mr. Cone says, "a serious factor in the commercial and industrial prosperity of the country." The data given in the paper will be useful to tar producers when engaged in a little argument with road surveyors. It is also an excellent point, in connection with this subject, that highway authorities should be as familiar with the costs of road maintenance as with the costs of construction.

Kent-Hodgson Shunt Meter.

Many ingenious and novel inventions are associated with the names given in this heading; and an addition is made, through the article Mr. John L. Hodgson has contributed to this issue. It describes the shunt gas-meter. It is on distinctly novel lines, but is said by Mr. Hodgson to be "an extremely simple, cheap, accurate, reliable, and adaptable meter, which is equally suitable as a station gas meter or for measuring the gas made by, or sold to, industrial plants." That it will prove of interest to gas engineers goes without saying.

The Public Lighting Engineer.

In every city and large town, a public lighting engineer is an indispensable official. Some local authorities assert that they cannot afford such a "luxury." But as a matter of fact such officials are found to be highly profitable. At the luncheon which the Sheffield Gas Company gave the Association of Public Lighting Engineers last week, Lieut.-Colonel H. K. Stephenson, D.S.O., LL.D., D.L., J.P. (the Chairman of the Company), supplied figures which showed how, since Mr. Colquhoun was appointed to carry the responsibility of controlling and improving the public lighting, he has obtained more light for lower consumptions of the two agents, which is to the advantage of the city. In other words, a greater efficiency has been realized on economical terms permitted by improvements in the appliances themselves. When such appliances are secured, it requires an expert to know how to make the best use of them. Lieut.-Colonel Stephenson's figures are well worth looking up and noting, for use in assisting backward lighting authorities to a proper appreciation of the position, and in persuading them to do likewise.

Light Oils and Spirits.

Since the Budget, there has been a reawakening of interest in the production of light oils and spirits in this country. Among the latest movements, is the flotation of British Benzol and Coal Distillation, Ltd., one of the Directors of which is Sir

Arthur Duckham. The Illingworth Carbonization Company, Ltd., has been registered to take over the business of the pioneer Illingworth concern; and another company is Oil Installations, Ltd. Other concerns have been hinting through the Press that they are considering the position in view of the encouragement the rate relief scheme offers.

"F.B.I." and Industrial Peace.

The Grand Council of the Federation of British Industries, having heard Lord Melchett's report on the conference he and his friends have had with the General Council of the Trade Union Congress, have assured him and his colleagues of their sympathetic consideration of the recommendations. The Federation Grand Council are wholeheartedly at one with the conference in its prime objects, and will examine the recommendations from that point of view. They have therefore appointed a Committee representative of all the industrial groups of the Federation to investigate the proposals and the various questions involved.

PERSONAL.

Mr. F. H. Vince, who for some years has been Resident Superintendent of the Redheugh Works of the Newcastle and Gateshead Gas Company, has been appointed Superintendent at the Granton Works of the Edinburgh Corporation Gas Department.

Mr. W. C. Chapman, Assistant Engineer and Manager of the Boston Gas Light and Coke Company, has been appointed Engineer and Manager of the Company, in place of the late Mr. J. Stewart Dougall. Prior to going to Boston, Mr. Chapman was Chief Technical and Works Assistant to Mr. P. D. Walmsley at the Great Yarmouth Gas-Works. He was trained, under the late Mr. W. J. Carpenter, at the Yarmouth Works, and in all served the Yarmouth Company in varying capacities for 22 years.

LUNCHEON TO SIR ARTHUR DUCKHAM.

As already stated in the "Journal," Sir Arthur Duckham, K.C.B., has been invited by the Government to act as Leader of a Commission to visit Australia for the purpose of conferring with the Australian Government and with representatives of industry and commerce with regard to the development of Australian resources and on matters affecting the common interests of Australia and the Mother Country.

A general feeling was expressed that the opportunity should be taken of conveying to Sir Arthur the good wishes of his many friends in the gas industry that success may attend the important work which he has been called upon by the Government to undertake; and it was decided to give a luncheon in honour of Sir Arthur before he leaves this country for Australia. Representatives of the governing bodies of the following Associations were invited to participate: The British Commercial Gas Association, the Federation of Gas Employers, the Gas Companies' Protection Association, The Institution of Gas Engineers, the National Gas Council, and the Society of British Gas Industries. The function is at the Savoy Hotel to-day.

OBITUARY.

SIR CHARLES JAMES JESSEL, BART.

It was with much regret that we learned of the death last Sunday night, following an operation, in a Tunbridge Wells nursing home, of Sir Charles James Jessel, Bart. He was aged 68, and had suffered from acute appendicitis and peritonitis.

To readers of the "Journal," and investors in gas undertakings generally, Sir Charles was best known as Chairman of the Imperial Continental Gas Association and as a Director of the Bournemouth Gas and Water Company and of the South African Lighting Association, but he was also connected with a number of other business undertakings, and was called to the Bar by Lincoln's Inn in 1885, though he did not practise. The elder son of the late Right Honourable Sir George Jessel, Master of the Rolls, and brother of Lord Jessel, he was born on May 11, 1860, and was educated at Rugby and Balliol College, Oxford. There he was President of the Dervorguilla Society, and took honours in classics and law. In 1903 he was High Sheriff of Kent; and in recognition of the eminent services of his father, who died in March, 1883, he was created a Baronet in the following May.

In 1920, Sir Charles Jessel was presented with the Imperial Continental Gas Association's long-service medal, on the completion by him of 25 years' service, which began on Nov. 6, 1895, when he was appointed a Director of the Association. He was elected by his colleagues to the position of Chairman in March, 1913. The London staff had previously availed themselves of the occasion to convey to the Chairman their good wishes and their appreciation of the cordial relationship which has always existed between him and the staff.

In writing of Sir Charles Jessel, reference to his kind thoughtfulness for others and his courteous manner seems almost superfluous, so much were these lovable qualities part of his nature; but in addition he was a keen business man, who will be greatly missed by his colleagues on the Boards of the Companies already mentioned, the officials, and all who were in the habit of attending the meetings. The genial smile and friendly word which those who knew him had learned to expect were invariably forthcoming.

The funeral took place yesterday at the Golders Green Jewish Cemetery.

JAMES WILLIAM GLOVER.

We regret to announce the death, on July 14, in his 87th year, of Mr. James William Glover, at his home at New Milton, after a short illness. Mr. Glover was born in Edinburgh in 1841, his father being Dr. William Glover, the eldest son of a large family which included Mr. Thomas Glover and Dr. George Glover, the founders of the firms of Thomas Glover & Co. and George Glover & Co. respectively.

Though he lived to a great age, Mr. Glover, when a boy, was considered delicate, and was not sent to school, but received a sound education from his father. Before he was 13 years old he lost his father, and his mother having died previously, he came to live in London, where his uncle Mr. Thomas Glover took him into his office. In 1861 Mr. Glover joined another uncle, Dr. George Glover, and assisted him in the preparation and perfection of the standard gasholders for the Board of Trade, as well as in the foundation of his dry meter business. It will be remembered that in 1901 the firm of George Glover & Co. was turned into a private limited company, and amalgamated with Messrs. Richmond. After the death of his cousin, George Raleigh Glover, the first Managing Director of the Company, Mr. J. W. Glover was appointed to that position, which he held until 1916, when he retired from active participation in the business, though he has ever since taken a keen interest in the work of the firm, and as recently as May came to London to visit the reconstructed Ranelagh Works.

Deceased had an outstanding personality. He was a man of strict integrity, and was greatly respected by all who knew him. He took a keen interest in music, and was an active church worker. Until two years ago he was Session Clerk of the Putney Presbyterian Church, and a member of the church choir.

On the death of his wife in 1926, Mr. Glover left London and settled at New Milton, in Hampshire. He leaves two sons, two daughters, and five grandchildren; the eldest son being Mr. Albert W. Glover, General Manager of George Glover & Co., Ltd., and the eldest grandson being Mr. Dennis S. Glover, the Company's representative in the midland and eastern counties.

A shadow was cast over the South Bank district when it became known that Mr. Samuel Shadbolt, a popular figure in the social, business, and public life of the town, had been found shot dead in his office on Sunday afternoon. Mr. Shadbolt, who was 48 years of age, went thirteen years ago from Fleetwood to South Bank, where he occupied the position of Engineer, Manager, and Secretary of the South Bank and Normanby Gas Company. He was a member of the Eston Urban Council and the North Riding Council, and was prominently identified with the Rotary movement, of which he was one of the founders in the Eston area, and he was a Commanding Officer of the South Bank St. John Ambulance Brigade. The memory of two recent operations, and the fear that he would soon have to undergo another one, are believed to have preyed upon his mind. At the inquest Dr. John Murray, the family doctor, told the Coroner that he attended Mr. Shadbolt during last week for enteritis, which necessitated practically starvation diet. Previously Mr. Shadbolt had been dieting to reduce his weight. He was obviously unfit to start work again. It was stated that deceased had never threatened to take his life; and so far as his son knew, he had no financial worries. The Coroner returned a verdict in accordance with the medical evidence—that deceased shot himself while temporarily of unsound mind—and added that undoubtedly fear of another operation preyed on his mind.

Mr. Francis Chalmers, for many years Manager of the St. Marychurch Gas-Works, died at Torquay on July 7, at the age of 56. Mr. Chalmers succeeded Mr. J. Evans in the management of the undertaking when it belonged to the St. Marychurch Urban Council, and held the post until the Torquay Corporation disposed of the works to the Paignton and Torquay Gas Company. Deceased was well known in Masonic circles.

ELECTRICITY SUPPLY MEMORANDA.

THE Electrical Contractors' Association are very much persuaded that, in the interests of the electricity supply industry and their own, it is necessary that all things should be done that are possible to ensure good installation work. The gas industry unites to this appreciation of an obvious fact its feeling that the sooner foolish electrical contractors are cleared out of the field, the quicker there will be greater safety for those people who require both gas and electricity in their residences, or even electricity alone. The "E.C.A." have lately held their annual conference at Cheltenham; and the retiring President (Mr. W. A. Shaw) had much to say on the subjects of registration and compulsory wiring rules. Apart from the better regulation of trading conditions within the electrical industry, he finds the most serious problem that confronts them is the shoddy workers and workmanship in the electrical trade. He made the pertinent inquiry as to what the members are doing individually and collectively to solve the problem. To deal broadly with the situation, the National Register has been founded; and it has been recognized by electricity engineers, but not to any extent by other people. The fact of the matter is, other people have not been apprised of the existence of the register or of its objects. In his annual report (which is something apart from the address), Mr. Shaw asks: What have we done to bring the principles of registration—especially the execution of good work—to the notice of the public? He knows there are electrical men who shiver at the idea of giving the public even a hint that there is any difference between the work of the reputable electrical contractor and his shoddy counterpart. They think this is a confession of danger in connection with electricity; but better such confession than the subsequent proof of it in an ugly fashion which might do untold harm, by upsetting the public more than would previous information as to the possibility of danger. However, the Council of the Association feel the need for public education in this matter; and so a pamphlet is being prepared for public distribution. That is a very proper course.

To Promote Safety.

Compulsory Wiring Rules Wanted.

Reverting to the address, Mr. Shaw referred to the Presidential deliverance of Mr. F. W. Purse at the meeting of the Incorporated Municipal Electrical Association, in which the members of the latter were urged to support registered contractors in every way. He also suggested that careful consideration should be given to more determined methods of forwarding the central object of the National Register. He intimated that one way of doing this would be to have a set of compulsory wiring rules, providing a standard below which no work would be permitted to be connected with the public mains. Such a scheme would carry with it full authority to electricity supply departments to inspect installation work in progress, and to refuse connection to any work below the given standard. If the two immediately interested sections of the industry made suitable representation to the Electricity Commissioners, it is felt that there would be a distinct possibility of wiring rules being made nationally compulsory.

Talking of Dangers is the Way to Safety.

Mr. W. R. Rawlings in a subsequent paper spoke out regarding the dangers of electricity—dangers calculated to bring about fire and instant death—associated particularly with the alternating system of supply. He does not think there is anything to be gained by hiding the fact; on the contrary, frankness is the best way to get people to understand that electrical installation must be well done to get the maximum assurance regarding safety. We agree with him that speaking of the dangers will not do more to hinder the progress of electricity than would talking of road dangers stay the progress in adoption of motor cars, and the publication of information regarding the explosive and toxic qualities of gas stop its wonderful advance in the service of the public. Danger, of course, exists almost everywhere; and though the electricity industry has been at some pains to show an unwarranted innocence, it has been unable to screen-off from the public the painful facts of published events. The denial of electrocutions is not easy; but a fire which sometimes wipes away the evidence of origin is a favourite ground of the electrical disputant and cynic. But Mr. Rawlings believes in being frank and bold. He regards it as nothing short of a duty of all engaged in the electricity industry to safeguard the public, and to point out where dangers do exist. The knowledge may be preventive of tragedy; the want of it may bring about a death which would probably do infinite harm. One of the greatest risks with electricity is that actual information as to a dangerous state is often only secured by the layman by actual contact, which may be the means of ending his life. In some of the matters to which Mr. Rawlings referred in the paper, the danger is obvious; but he submitted that it is not obvious that a leak on the live side of a wire may, under unseen conditions, come into contact with the body even though ordinary precautions be taken. Mr. Rawlings gives support to Mr. Shaw's pleas by pointing out that the public at the moment do not appreciate the electrical dangers lurking near them; otherwise they would not allow inexperienced persons to interfere in any way with their electrical installation. He hopes the time is not far distant when it will be illegal for anyone not fully qualified to instal electrical work.

Domestic Electrification at Maidstone.

In supplying the "Electrical Times" with some particulars as to domestic electrification at Maidstone, Mr. E. E. Hoadley made certain criticisms and suggestions regarding the various apparatus. As to electric cookers, he finds progress is accelerating. But he hopes that manufacturers will realize that the high initial cost, rendering necessary a high rate of hire, is a real drawback. He thinks that soon it should be possible to standardize the oven and the fuses, and the overall dimensions of the tops; leaving it to the individual makers to fit whatever hotplates they deem best. For good results in electric cooking, it is essential that the voltage should be maintained at the declared; and therefore in his new and replacement main work, Mr. Hoadley is laying distributors of a size which would have been thought ridiculous a few years ago. He is of opinion that most undertakings are in a position to meet the increased charges on the larger mains which will not be fully loaded for a few years. Respecting water heating, he believes this will be, before many years pass, one of the biggest outlets for the use of electrical energy. He considers the apparatus is now approaching a high state of efficiency, that the hot water wants of most householders can be met electrically with advantage to the supply authority, and this at a cost which compares very favourably with other methods.

Conclusions.

The concluding submissions of Mr. Hoadley are that cookers should be cheaper and should be standardized. There is also room for "considerable" improvement both in the quickness and the reliability of hotplates. He is of opinion that electric fires and most kettles and water heaters are now "fairly" satisfactory, and fires at least are hired at a price to which no exception can be taken. Mr. Hoadley states that personally he has run his house for twelve months without an ounce of coal or coke or any gas. At the current rates he found it somewhat expensive; and it was not possible to do away with one of two maids. Only electric cooking has been in use in his home for twenty years; and for several years past he has done everything electrical with the exception of using one coal fire in the sitting room which is occupied all day in winter. These conclusions do not constitute exactly undiluted praise.

Distribution Costs.

One of "Meteor's" recent notes refers to the high cost of distribution. The members of the Institution of Electrical Engineers have been having a summer visit to Scotland; and "Meteor," when he was listening, found that a favourite subject of conversation was the high cost of distribution. Several times he overheard comment on the lamentable fact that it costs at least £40,000 to tap the E.H.T. grid. This Dr. Ferranti regards as a confession of failure, and so do several other engineers. "Meteor" points out that not many years ago a complete and new generating station and mains could be put down for about £40,000. It will now cost £40,000 or more to tap a single service off the E.H.T. mains. The question is asked, Have we progressed or retrogressed?

Lighting Campaign in Factories and Workshops.

Last year a survey was made of the lighting in a number of factories and workshops, and, as was expected, it was found to be very indifferent, and that considerable improvements could be effected with advantage. The electricians always find things are wrong when they inspect a gas-lighted factory. However, we quite agree there is wide scope for improving the lighting of many factories and workshops by means of the latest types of incandescent gas-lamps. The Electrical Development Association are going to see whether they cannot get part of the work for the electricity industry, and so it has been decided to run an intensive campaign for the purpose. All electrical men are invited to co-operate in it. It is said that the basis selected for the campaign is postal communication to the executives of the factories and workshops, so that the story cannot fail to reach those who are concerned.

Electrical Research. The Electrical Research Association has done profitable work for the industry, and been the means of effecting savings which in the aggregate have meant much. But it has been doing this by Government aid, which is waning, and will disappear altogether by 1930. A conference has been held to see what shall be done about the matter. On that occasion Mr. H. T. Tizard, Secretary of the Department of Scientific and Industrial Research, outlined the policy towards the various Research Associations which they have helped to bring into being. In his opinion, it is time the electrical industry put its Research Association on a sound financial basis; and he asserts that it is in a position, with a revenue of upwards of 40 millions, to support it. The speakers who followed were evidently not proud of the measure of support the industry has hitherto given to the Association. They rather directed their speeches to showing how much so many shillings per £1000 of revenue would provide; and the calculations showed substance. However, the conference (which was representative of the principal bodies interested in electrical engineering and research) undertook to confer with their respective organizations in order to ascertain the amounts which each might contribute towards the funds, in order to secure and extend the present scale of expenditure—£25,000 per annum—and to double it within five years. The representatives will report the result to a Committee to be set up, and call a further conference. Recommendations are also required from the "E.R.A." Council as to the changes in the Articles of Association necessary to give adequate representation to the contributing interests.

Aviation and Overhead Lines. The "Electrician" has had its knuckles rapped by Mr. T. Stanhope Sprigg, Editor of "Airways." Certain events have shown that there is in overhead transmission lines great danger to those who go up in the air in any form of aircraft; and the fact has been the subject of comment, directed to the question as to whether the development of air transport should not be assisted by the burying of electricity transmission lines, instead of having them overhead all over the country. But electricians are the most selfish persons on earth. They cannot see that anything should be allowed to interfere with the development of electricity supply on the most economic lines available, even to the detriment of the progress of some other interest. In this particular case development of aviation has only one field of action—the air—while electricity transmission has the underground course as well as that of upsetting the freedom of the air for the advance of aviation. Electricity claims the right to the latter in its own interests, and that is where the Editor of the "Electrician" exposed himself to the correction of Mr. Stanhope Sprigg. That gentleman tells him that the last thing the aviator wants is "to take potshots" at electric insulators. On the contrary, both in his own and the electricity industry's interests, he would prefer electric transmission lines carried underground. Then it is pointed out to the electrical critic that his remarks as to the "vast spaces through which aeroplanes can roam," and the advantages of their having "to proceed warily at altitudes below 100 ft.," is robbed of much of its practical value on account of the fact that aircraft at present are unable to land at an altitude of 100 ft. Then a disparaging reference to "the convenience of a few flying men" when a world-wide service is in view, is disappointing in the Editor of a technical paper as showing an inadequate appreciation of the great future of air transport. And still more from Mr. Sprigg. We cannot congratulate the "Electrician" on the weight of its comment upon Mr. Sprigg's sprightly letter.

Mishaps. The vacuum cleaner is one of the most popular pieces of domestic apparatus the electricity industry exploits; and it must have been unpleasant to it to have had such wide publicity given to the fatality in South London, on Tuesday of last week, through the use of a metal handled cleaner. The victim was Mrs. Emma Eugenie Williams, wife of a Lambeth Borough Councillor. We need not go into all the details of the sad event as related at the inquest. Sufficient is the evidence of Mr. Charles A. Baker, Senior Electrical Inspector, L.C.C. He said the top of the handle of this cleaner was metal covered, and contained the switch which started and stopped the motor after the flexible cord had been plugged in. The handle of the cleaner should not be in the electric circuit at all; it should be entirely insulated. The switch in this particular machine was defective. If such machines were fitted with ebonite handles (providing the ebonite were good) such a fatality would not take place. The jury recommended that vacuum cleaners should not be supplied to the public unless the handles were properly insulated. On the 10th inst., Stanley Jones (aged 14) was electrocuted at the Coventry Public Swimming Baths. It was stated at the inquest that the boy caught hold of a live wire which was hanging from a fuse-box; the wire being only 6 ft. from the ground. The jury returned a verdict to the effect that death was due to shock caused by current from a defective electric fitting. They expressed the opinion that the fitting should have been removed or secured at the first opportunity; also that such work in Corporation buildings should be carried out strictly under the supervision of qualified electricians. On the 12th inst., damage amounting to £500 was done by fire at a baby linen shop at Halifax. The outbreak is attributed to the fusing of an electric wire. Through the fall of an overhead electric wire on July 18, 1927, Mrs. Mary O'Donnell was injured while riding on one of the cars of the Lanarkshire Tramway Company, Motherwell. She claimed £1000 damages; but a settlement has been effected for £275 and expenses. Owing to the fusing of an electric cable in the roof over a new part of the Mechanics' Institute at Cambois, £6000 damage was done, despite the efforts for six hours of the Ashington detachment of the Durham and Northumberland Collieries Fire Brigade.

NATIONAL GAS COUNCIL.

Meeting of Central Executive Board.

A Meeting of the Central Executive Board of the National Gas Council took place on July 10, at No. 28, Grosvenor Gardens, S.W. 1.

Chairman and Vice-Chairmen.

Sir David Milne-Watson was re-elected Chairman of the Central Executive Board for another year.

The four retiring Vice-Chairmen—Alderman F. S. Phillips, Mr. William Cash, Mr. J. H. Ellis, and Mr. F. H. Jones—were also re-elected.

Ammonia Recovery.

It was reported, on behalf of The Institution of Gas Engineers, that in accordance with the request of the Central Executive Board a Committee had been appointed—in view of the very low prices received for ammonia and the great difficulty experienced in disposing of ammoniacal liquor—to explore the possibilities of manufacturing sulphate of ammonia direct in the process of gas manufacture, and so reducing the cost of production. The following constitute the Committee: Prof. J. W. Cobb, Dr. A. Parker, Mr. T. F. E. Rhead, Mr. H. Hollings, Mr. E. V. Evans, Mr. P. G. Moon, Mr. H. E. Bloor, Mr. J. Wilkinson, Mr. W. W. Townsend, Dr. E. W. Smith, and Mr. C. F. Botley (Chairman).

Liquor Effluents Research.

It was reported that the Liquor Effluents Research Committee of The Institution of Gas Engineers had issued its Second Report, and copies had been circulated to the members of the Board. By arrangement with the Institution, the Report had been printed and circulated in connection with the Annual Meeting of the Institution at Cardiff. It would also appear as an Appendix to the June Report of the Council.

It was reported, on behalf of the Institution, that satisfactory progress was being made in connection with the experiments being carried out at Hinckley and Coventry, and that their final outcome could not fail to be of assistance to members of the gas industry.

British Industries Fair, Birmingham, 1929.

It was reported that from a letter received from the Committee which was organizing the Gas Section at the above Fair, which takes place from Feb. 18 to March 1, 1929, it appeared that they were anxious that conferences of representatives of the industry should take place in Birmingham during that period. Similar communications had been sent to the other bodies connected with the gas industry. It was decided that this suggestion should be borne in mind.

Electrical Developments in Rural Areas.

It was reported that in March last a Memorandum was prepared by the Chairman of the Agricultural Committee of the County Councils Association (Sir Douglas Newton, M.P.) and Sir Mervyn Manningham-Buller, M.P., dealing with electrical developments in rural areas. The Memorandum contained, *inter alia*, a recommendation "that the Government be requested to set aside funds for the electrification of rural areas by approved associations on easy terms." It was agreed that the Council should write to the Board of Trade, protesting against the use of public funds in this manner.

Date of Next Meeting.

It was decided that the next meeting of the Board should take place on Tuesday, Sept. 11.

THE STAINES WATERLESS HOLDER.

[*Surrey Flying Services.*

AN AERIAL VIEW.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

MEETING AT LEEK.

The 211th Quarterly Meeting of this Institution was held at Leek on Friday, July 13; about ninety members and guests being present. A visit of inspection was paid to the recently modernized gas-works at Leek, where the Institution were welcomed by Councillor H. J. COPE, J.P., Chairman of the Leek Urban District Council. A full description of the works, which are managed by Mr. R. H. Ginman, the President of the Institution, appeared in the issue of the "JOURNAL" for March 7.

By the kind invitation of the Chairman and members of the Leek Urban District Council, the members and friends were subsequently entertained at luncheon at Alton Towers, formerly the seat of the Earl of Shrewsbury.

LUNCHEON SPEECHES.

Councillor Lieut.-Colonel L. J. WORTHINGTON, J.P. (Vice-Chairman of the Leek Urban District Council), in proposing the toast of "The Manchester District Institution of Gas Engineers," said that last year, when the members of the Lighting Committee of the Leek Urban District Council learned that Mr. Ginman, their Gas Engineer, had been appointed Vice-President of the Institution they naturally congratulated him and felt that a certain amount of reflected glory appertained to themselves. To attain the Vice-Presidency of such an Institution implied high scientific qualifications; and it was felt that Mr. Ginman had received the honour owing to the excellent work he had done for the Leek Urban District Council. They were still more delighted to hear of his appointment as President for the present year.

The PRESIDENT, responding to the toast, observed that in his year of office, he had been encouraged and supported by his Chairman, and by the members of the Gas and Lighting Committee. He hoped that all present had enjoyed their visit to what could now be regarded as a model gas-works, which could produce 25 p.ct. more gas than was formerly the case, without any increase in wages costs.

Mr. R. G. SHADBOLT (Past-President of The Institution of Gas Engineers) proposed the toast of "The Leek Gas Department." He referred to the fact that it was 21 years since the Institution last visited Leek upon a similar occasion. To his mind, the outstanding figure upon that occasion was the then Chairman of the Gas Committee, Mr. T. H. Booth, who was a veritable Trojan as far as the interests of the Gas Department of Leek were concerned. He continually strove to maintain the status and increase the utility of the Department over which he presided. At the present time, the prices for gas in Leek ranged from 3s. 3d. down to 2s. 6·7d. per 1000 c.ft., which indicated the progress which had been effected. When he looked at a souvenir of the meeting 21 years ago, he found that some of the words which appeared upon it might have been written for the present occasion. For instance, it stated: "The works consist of an up-to-date plant." That was true 21 years ago; and it was true to-day. A second statement was to the effect: "The present area of gas supply in Leek has recently been much increased so as to include the villages of Longsden and Rudyard." To-day, the gas authorities of Leek were seeking to extend their district to Leek Brook and Cheddleton. Mr. Ginman had already stated that, without increasing the cost of production, there could be an increase of output from the present plant of some 25 p.ct. As engineers, they could not but admire, and give proper credit to, Mr. Ginman for the work which he, in conjunction with his Committee, had done during the past fourteen years.

Councillor W. A. FURMSTON (Chairman of the Leek Gas and Electricity Departments) responded to the toast. No doubt some of the visitors would think it strange that he should be described as Chairman of the Leek Gas and Electricity Departments. Perhaps people would wonder how it was possible for the same Chairman of the same Committee to fulfil his duty in fully developing two departments which were frequently considered to be diametrically opposed. In former times, Leek had its two undertakings managed by two different Committees. These Committees unfortunately, to the detriment of both undertakings, were always at "loggerheads" with each other; and the Council determined to prevent their squabbles by placing both undertakings under the control of one Committee. It had been his privilege to be the Chairman of that Committee for fifteen years; and though at first he had found his task an onerous one, as had also the individual members of the Committee, yet he could honestly say that the Committee had done their best to further the welfare of both undertakings without any display of bias towards one or the other. Upon the present occasion, they had only to think of the gas phase of their duties. Those who had been through the gas-works that morning would, he was sure, readily acknowledge that the Committee had done all they possibly could to render the works as efficient and up-to-date as possible. They would be able to realize that the Gas Department had in no way suffered from the fact that they had also to manage the electricity undertaking. This result was only what it should be. There was room for both gas and electricity, as long as the competition was fair. The members of the Leek Urban District Council felt very proud indeed that the Manchester District Institution of Gas Engineers had elected their Manager to the highest position it was within their power to bestow. No one could be associated with Mr. Ginman for long without realizing to what profession he belonged; he was absolutely enthusiastic about his work.

Councillor V COWLISHAW, proposing "The Visitors," said that when it was known that the Institution were to visit Leek, the question arose as to what was to be done for the entertainment of the visitors after they had inspected the gas-works. Much discussion centred round the idea that the new silk mills, in particular, should be visited; and then it occurred to all concerned that Stafford-

shire, besides being famous for its iron, coal, pottery, and silk industries, was also famous for its scenery, and that anyone coming from the industrial North would be glad to see a little of it. In the result, therefore, the visit to Alton Towers was determined upon; and he thought that all the members of the Institution would remember their outing for many years to come.

Sir Francis Joseph, C.B.E., J.P., President of the North Staffordshire Chamber of Commerce, responded. He knew of no industry, he said, which had so co-ordinated research work as had the gas industry, and it had also been very quick to seize the advantages which could be secured by advertising, which had now become elevated to a science.

Alderman T. Cook (Chairman of the Manchester Corporation Gas Committee), in responding to the toast, and in acknowledging the hospitality which had been extended to the Institution, expressed the hope that when the new Manchester Works at Partington were opened, probably in September, the members would have an opportunity of inspecting them.

Mr. W. G. S. Cranmer (Willenhall, President of the Midland Association of Gas Engineers and Managers) also responded to the toast.

Mr. W. B. McLusky (Senior Vice-President, Engineer and Manager to the Halifax Corporation Gas Department) proposed the toast of "Our Hosts," which was supported by Mr. W. J. Smith, B.Sc. (Junior Vice-President, Engineer and Manager to the Bolton Corporation Gas Department), and responded to by Councillor Pope.

THE WATERLESS HOLDER AT TORONTO.

By William R. Gardner, Superintendent of Holders, Consumers' Gas Company, Toronto, Ont.

[From a Paper before the Canadian Gas Association.]

Having discussed the erection of the 4-million waterless holder, by which it was possible to gain 1 million c.ft. storage on the available site, the author went on to consider its operation. As is well known, he said, tar is the sealing medium; and as the holder is the farthest north on this Continent, and is subjected to extreme reverses and erratic climatic conditions, it is somewhat of a criterion. After operating the holder through the past two winters, we can speak with confidence; and our conclusion is that the successful operation of these holders lies in keeping the tar in perfect condition during the winter months. Summer conditions are much less stringent. In speaking of the tar, this only applies to similar climates to our own; a warmer climate is to its advantage. In winter months the tar must be absolutely free from water. The condensate of water and light oil quickly accumulates in the system during winter, owing to the fact of the gas going into the holder at about 70° and leaving at about 30°. We have been passing approximately 10 million c.ft. per day through this holder, and our condensate averages 40 gallons of water and light oils combined per million c.ft. passed; the mixture of gas being about 50 p.ct. coal gas and 50 p.ct. water gas. The holder is what is known as a works holder. I have figures pertaining to other holders known as outlying holders—one is a 15 million c.ft. holder, about ten miles from the works, and the condensate only amounts to 5 gallons per million c.ft. of gas. Of course, the condensation takes place in the mains before it reaches the holder, and is pumped out in the usual way in the district drip pots. Evidently, the greater the distance from the works, the less the condensation. The condition of the tar is considerably improved owing to the temperature of the gas passing in and out of the holder being about the same.

During a rapid drop in temperature last November, we were surprised to discover that the tar in the cup had assumed a mushy, snowlike condition, though the day previous it was judged to be absolutely safe as regards its consistency. We were not alarmed, as we had seen this the previous winter. We telephoned the makers of the holder, who sent their representative; and his suggestion was to instal a tar conditioner. We took his advice, and the conditioner was erected and completed in one month. It has worked practically continuously ever since, with most satisfactory results. It keeps the entire system free from water, and allows us to retain a certain percentage of light oils which we require in severe cold weather to maintain the fluidity of the tar for sealing purposes. I might say that it is only necessary to instal the conditioners in connection with works holders.

Tar Conditioner Described.

The manufacturers of the holder are the patentees of the tar conditioner apparatus, which is designed in the form of a series of pipe trays welded together and inserted in a tank about 4 ft. 6 in. in diameter by 6 ft. long. The conditioner is supplied with live steam at a pressure of from 80 to 100 lbs. gauge. The tar flows constantly from the discharge side of a small rotary motor-driven pump, the suction drawing it from the holder dam at the rate of 6 gallons per minute. After passing through the condenser, which is of the radiator type, the tar returns to the holder dam through the conditioner, the light oils pass on to storage, and the water flows to a drain. The cooling action in the condenser is obtained by the cool raw tar taken from the dam, which in turn receives a certain amount of pre-heating previous to passing over the pipe trays in the conditioner.

As to the future of this type of holder, it can only be determined by the optimistic view already taken by gas engineers in various countries; and the enormous amount of capital being invested in one holder alone of 20 million c.ft. capacity, which is being built at the present time, shows the confidence engineers have in the waterless type. To use an old saying, they are not afraid to put all their eggs into one basket.

There is now a waterless holder on the market with an absolutely dry seal; and I have a photograph of the first one in commission at Dormont, Germany. Four contracting firms of repute in England, who are interested in this design, speak most favourably of it.

COAL AND BYE-PRODUCT EXPORTS.

The data regarding exports of coal, &c., in May are not of an enlivening character. Neither in volume nor prices can anything be found of which to boast.

Coal Exports.

Business in coal of all sorts amounted in May to 4,487,032 tons, compared with 4,802,805 tons in May, 1927, and 1,448,368 tons in May, 1926. The values were: May, 1928, £3,500,475; 1927, £4,407,722; and 1926, £1,392,437. Gas coal was represented in those figures by: May, 1928, 592,047 tons; May, 1927, 600,082 tons; May, 1926, 167,548 tons. The values for those quantities were: May, 1928, £433,007; 1927, £492,828; 1926, £137,005.

In the five months ending May, the total coal business was 20,232,049 tons; in the corresponding period of 1927, 22,005,967 tons; and in that of 1926, 18,929,604 tons. The values were: 1928, £15,911,351; 1927, £20,949,677; 1926, £17,191,388. Gas coal made the following contributions to these figures: In the five months ended May this year, 2,619,143 tons; in the same period of 1927, 2,880,006 tons; and in that of 1926, 2,491,787 tons. The values of these quantities were: 1928, £1,952,811; 1927, £2,501,950; 1926, £2,032,988.

Coke Exports.

The amount of coke exported in May only reached 20,011 tons; in May, 1927, 33,147 tons; and in May, 1926, 4402 tons The values were: May, 1928, £19,778; 1927, £34,494; 1926, £4302.

In the five months, gas coke shipments amounted to 354,653 tons; in 1927, 279,274 tons; and 1926, 367,227 tons. The values were: 1928, £364,737; 1927, £318,864; 1926, £378,820.

During the five months, "other sorts" of coke shipped abroad amounted to 474,530 tons; in the same months of 1927, the quantity was 177,860 tons; and in those of 1926, 373,235 tons. The values were: 1928, £470,889; 1927, £260,310; 1926, £425,550.

Tar Products.

There was a notable shipment of benzole in May—the quantity being 543,730 gallons; compared with 3853 gallons. The result of this is that in the five months 781,617 gallons were exported, as against 26,620 in the same period of 1927. Naphtha we can by-pass. Tar, oil, creosote, &c., took flight to 7,665,139 gallons in May, as against 4,115,464 gallons. In the five months the quantity totalled 17,954,500 gallons; and in the corresponding period of 1927, it was 18,238,827 tons. The amount of pitch sent abroad in May was 18,488 tons, compared with 37,104 tons in May, 1927. In the five months, the quantity of pitch sold overseas was 127,922 tons; and in the same period of 1927, the amount was 144,856 tons.

Sulphate of Ammonia.

In May, 1928, 27,672 tons of sulphate of ammonia were exported; in May, 1927, 30,487 tons. In the five months, the total quantity shipped was 131,621 tons, compared with 79,662 tons. Of the 131,621 tons, Japan took 36,843 tons; Spain and the Canaries, 25,624 tons; and Dutch East Indies, 22,133 tons.

Gas-Oil Imports.

The deliveries of gas oil in May were 13,529,368 gallons, as against 4,470,187 gallons in May, 1927. In the five months, the total delivery was 60,090,994 gallons, and in the same period of 1927, 48,972,441 gallons.

ASSOCIATION OF PUBLIC LIGHTING ENGINEERS.

FIFTH ANNUAL CONFERENCE IN SHEFFIELD.

A busy time was spent during the first half of last week by the large number of members of the Association of Public Lighting Engineers, who were holding their fifth annual meeting and conference in Sheffield, under the Presidency of Mr. J. F. COLQUHOUN, Lighting Engineer to the City of Sheffield. The business sessions, which took place in the handsome Council Chamber at the Town Hall, occupied the mornings of Tuesday and Wednesday, July 10 and 11; and the remainder of these days was occupied by visits and entertainment which was on the generous scale of hospitality that has always been a characteristic of Yorkshire. The Lord Mayor of the City (Alderman M. Humberstone, J.P.) practically throughout the two days devoted himself to the Association's work and the welfare of the visitors. In this he was ably supported by Lieut.-Col. H. K. Stephenson, D.S.O. (the Chairman), and the Directors of the Sheffield Gas Company, and by Mr. Ralph Halkett (the General Manager). Another name which must not be omitted in this connection is that of Councillor R. H. Minshall, the Chairman of the Lighting Committee. One of the most important features of the meeting was a series of experimental street lighting installations conforming to the recent British Engineering Standards Specification. There were present during the meeting Mr. John Terrace, M.Inst.C.E. (President of The Institution of Gas Engineers), Mr. Walter T. Dunn (Secretary), and Mr. J. C. Walker (Secretary of the British Commercial Gas Association).

Mr. A. C. CRAMB, of Croydon (the outgoing President), who occupied the chair at the opening of the proceedings on Tuesday, remarked that the work of the Association was of very great importance, and the papers to be presented at the present meeting, and particularly the practical demonstration of street lighting which had been arranged in Sheffield, should enable the members to return to their various towns with a good deal of valuable information. The Lord Mayor had honoured them with his presence; and he would now call upon him to offer a few words of welcome.

A WELCOME.

The LORD MAYOR (Alderman M. Humberstone, J.P.) said that, on his own behalf and on behalf of the Corporation, he wished to extend to the members and delegates a hearty welcome to Sheffield. The city was specially interested in the lighting question, because, before they were fortunate enough to secure the services of Mr. Colquhoun, Sheffield was looked upon as being one of the dark places of the country. It was badly lighted. In fact, they had not really recovered from the war scare, during which they had had to dim or extinguish a large proportion of the lamps. Many of the lamps thus extinguished had not been re-lighted. In 1924, when Mr. Colquhoun was appointed, there were only 11,112 public gas lamps in the city, and 287 electric lamps. There were now 13,988 gas lamps and 2176 electric lights. This was a marked improvement of 4765 lights; but the improvement had been not so much in the number of lamps as in the illuminating power of each unit. Formerly they had the old upright burner, the mantle of which, under the least wind pressure, became dislodged, and consequently ineffective; and the system of periodical visits frequently left some places for a time without light. Under the new conditions, however, these upright burners were soon swept away and inverted mantles were installed in their place, with the result that the lighting effect had been considerably improved. He thought that for this thanks were largely due to the Association of Public Lighting Engineers, because it was only through such organizations that a betterment of the various amenities of the cities could be brought about. He was sorry to say that there was as yet one little blot on Sheffield, which it was desired should be removed as soon as possible. This blot was that there were a good many unlighted courts and alleys. This matter was, however, now being tackled in the right way, as both the Watch Committee and the Lighting Committee realized that it was a duty to see that all courts and alleys with houses in them were properly lighted. Another thing they were very anxious to do was to light in the very best manner possible the whole of the tramway routes. With this end in view, Mr. Colquhoun had been for some time experimenting; and he understood the members would have an opportunity of seeing the way in which some of the main thoroughfares were at present being lighted. It had to be remembered that illumination which twenty years ago might have been quite sufficient for these main thoroughfares would not meet the needs of the case in these days of swift-moving traffic. Main thoroughfares, in fact, could not be too well lighted to meet present traffic conditions. He hoped the assembly would have an instructive and enjoyable conference, and that they would go away with good impressions of Sheffield. They claimed that the city was not so black as it was painted. It was a picture with a beautiful frame.

Mr. CRAMB proposed a cordial vote of thanks to the Lord Mayor.

Mr. S. B. LANGLANDS, J.P. (Glasgow), seconded the vote. The Association were, he said, proud to come to Sheffield, and they were prouder still of the encouragement which the Corporation had given to their Lighting Engineer. They were looking forward to a most successful meeting.

The LORD MAYOR, in acknowledgment, remarked that, as a member of the Lighting Committee, he naturally took a keen interest in the work of the Association.

NEW MEMBERS.

The minutes of the last general meeting having been confirmed, the following new members were declared elected:

Messrs. F. Lewis, Wembley; E. Morgan, M.I.E.E., A.M.Inst.C.E., Wolverhampton; C. C. Sidaway, Droitwich; J. W. Toulson, Gloucester; C. V. Wedderburn, Tanfield, near Manchester; S. R. Windle, Grimsby; John Oram, London; W. J. Gillatt, H. Cressey, J. Whitehead, R. Allen, J. Hukin, A. Fletcher, G. Sayer, W. Hughes, E. Selwood, M. G. Lockwood, Sheffield; C. P. Banham, London; A. Snell, Bradford; E. Stroud, London; H. Harrison, M.I.E.E., Canterbury; E. H. Horstmann, B.H.S., Bath; F. E. Sharp, A.M.I.E.E., London; W. E. King, London; and C. C. Paterson, O.B.E., Wembley.

SCRUTINEERS.

Messrs. J. Love and H. C. Brown, of London, were appointed Scrutineers.

THE PRESIDENT,
J. F. Colquhoun, of Sheffield.

THE NEW PRESIDENT.

Mr. CRAMB, introducing the new President, remarked that Mr. Colquhoun was a quiet, steady worker. He did not advertise himself, but he got on with his job; and the fact that he had taken so much interest in the British Standard Specification, and had gone to so much trouble in connection with the practical demonstration of street lighting, placed them under a deep debt of gratitude to him. He was quite sure that what had been done was going to be of great help to all of them. They were very fortunate in having Mr. Colquhoun as President during the ensuing year; and he had the utmost pleasure in asking him to take the chair.

PAST-PRESIDENTS' CERTIFICATES.

Mr. COLQUHOUN (who was cordially received by the members) said his first duty as President was the pleasant one of asking the Lord Mayor to hand engraved certificates to the Past-Presidents of the Association. They had, indeed, been singularly fortunate in their Presidents. In his old chief, Mr. Langlands, who was the first President, and held the office for two years, they had a gentleman possessing excellent charac-

teristics. He looked well after the interests of the Association, and for his services they were extremely indebted to him. Unwise handling at that time would have wrecked the Association; but care and patience had brought it to success. Next came Mr. Shapley, with his tremendous driving power and great energy. Under his guidance, they had to move, and move quickly. The Association was then just at the stage for a man like Mr. Shapley to guide it well on its way. Then followed their friend Mr. Davison, from Newcastle-on-Tyne. He possessed plenty of caution and patience; but he stuck to his job, and "got there." After Mr. Davison came Mr. Cramb, of Croydon—a man rich in experience of Association work. This experience he had placed unreservedly at their service; and he had safely piloted the Association through a rather critical time with a firm hand and much wisdom. To all these gentlemen they owed much. They had set a high standard which it would be difficult for their successors to act up to.

The LORD MAYOR then handed the certificates to the Past-Presidents:

Mr. S. B. Langlands, Glasgow.
Mr. C. S. Shapley, Leeds.
Mr. R. Davison, Newcastle-on-Tyne.
Mr. A. C. Cramb, Croydon.

PRESIDENTIAL ADDRESS

of Mr. J. F. COLQUHOUN.

We have passed an important milestone in our history during the past year in that we are now incorporated, the licence being obtained from the Board of Trade on Jan. 21 last. The cost of incorporation was heavy on a young Association, but we are still solvent. Our membership has increased during the year from 113 to 146. Our work is greatly hampered through lack of funds, but we can say that the Association has justified, and is justifying, its existence; and I ask for your continued interest and increased support.

The British Standard Specification for Street Lighting was clearly expounded and explained by Messrs. Jolley, Waldram, and Watson at our last year's conference. I felt then, as I feel now, that an actual demonstration of that specification is essential in order to test out the various claims made, and the hopes expressed that if the specification was put into operation a definite advance would be made in the street lighting of the cities and towns of this country.

Accordingly I have, with the full approval of my Committee and the interest of the Department of Scientific and Industrial Research, and of the National Physical Laboratory, and with the help, willingly given, of the makers of street lighting apparatus, erected a number of installations to demonstrate the various classes of the British Specification. It must be kept in mind that the purpose is to demonstrate the specification, not the merits or demerits of any particular maker's goods. I invite you to inspect these installations, 50 in number. I have prepared a table giving a brief description of the fittings, the hourly consumption of gas or electricity, the arrangement of the lamps, the distance between the lamps and the distance from the test point, as laid down by the specification, to the nearest two lamps, the mounting height, the horizontal illumination, and the classes of the specification into which the installations fall. The photometric readings were taken under actual "service" conditions, but all possible care was taken to ensure that the lamps and burners were properly adjusted, no readings were taken during perceptible fog, and the installations have been classified in the table according to "rated" conditions.

Installations 2 and 3 form an interesting comparison. Installation 2 has large units of light erected at a considerable height and far apart. Installation 3 comes into the same class of the specification with smaller units closer together and at a lesser mounting height.

You will observe that, while the minima illuminations are almost identical (0·065 and 0·06 foot-candle) there is a considerable difference in the maxima (4 and 2 foot-candles). In my opinion the increased maximum illumination in Installation 2 does not add a great deal to the visibility on all parts of the street as compared with the visibility of Installation 3. You will note that the carriageway is 9 ft. greater in Installation 3 than in Installation 2.

Installation 4 is a good example of what ought not to be done. The lamps are arranged on one side of the street only, and the installation comes within, in every respect, Class H of the specification. But the result is unsatisfactory, and I suggest that a modification of the specification is necessary. Perhaps it could be met by a clause giving minima mounting heights of the units on one-sided lighting *in relation to the width of the carriageway*. Another point is that the distance between the lamps, on which the spacing-height ratio is based, is greater where the lamps are staggered than where they are placed on one side of the street only. I suggest that "effective" distance should be taken—the effective distance being the sum of the distances from the test point to the nearest two lamps.

A comparison of Installations 4 and 5 will show the great advantage, with low-mounted units, of staggered lighting. There is an increase on the minimum illumination in Installation 5 over Installation 4 of only 0·004 foot-candle, but the increase in visibility is considerable, at all events on the carriageway.

Installations 7 and 8 are identical except that No. 7 is fitted with half-clear and half-frosted globes, and No. 8 with clear globes. The ratio of minimum to maximum illumination is 1 : 18 with the half-frosted globes, as against 1 : 34 with the clear globes. The minimum illumination is increased from 0·05 foot-candle in Installation 8 to 0·066 in Installation 7. This is largely due to the globes.

The advantage of mantles being placed "in line" rather than "in circle" is shown by Installation 9.

Installations 10 and 11 may be contrasted with Installations 13 and 14; the former showing considerable uniformity of illumination, and the latter considerable contrast. There is a difference in the appearance of Installations 10 and 11. The measurements of illumination in both installations are almost equal, but the surface brightness on the roadway on Installation 11 is greater than on Installation 10. I have had no time to investigate this difference. It may be due to difference in gradient of the roadway, but it is more likely to be due to a difference in the distribution of light; the light rays from the fittings in Installation 11 reaching the road surface at angles more oblique than Installation 10. But surface brightness is not necessarily visibility, unless it is obtained by the silhouette effect when the bright surface of the roadway acts as a mirror.

In Installation 10, the distinction in two colours, green and brown, can be clearly seen at a distance of 57 yards when those colours are near the minimum test point. In Installation 11 they cannot be distinguished beyond 32 yards. This is entirely due to the more glaring light sources of Installation 11 over Installation 10.

Installations 15 to 21 are of value to demonstrate the higher "ratings" of the specification.

Installation 24 shows an interesting adaptation of directive prismatic glassware to gas street lighting.

A comparison of Installation 22 with Installations 25 and 26 again shows the value of gas mantles being placed "in line."

Installation 31 is of special interest. It is an endeavour to apply a form of floodlighting to street lighting. It does not conform to the specification in any particular. There are eight lamps (500 watt) in 710 ft. of roadway 42 ft. wide. The average spacing for normal lighting would be 97 ft. between the lamps and 54 ft. from the test point to the nearest two lamps, so that whatever may be said for this system of lighting, no claims can be made for it on the ground of economy when compared, for example, with Installations 30, 34, 39, and more particularly 38. But it is a new method of street lighting; and I direct your special attention to it.

A good deal more could be made of Installations 32 and 33. The adjustments are left as the makers wished, with the result that the minimum illuminations are to my mind needlessly low. We had minima more than double the present figures; but there were some circles of bright light on the ground, and the makers did not like them.

Installations 30 and 34 are 2-way directive refractors. The magnification in Installation 34 is approximately 8, and in Installation 30 somewhat less than 8. One is conscious of glare in Installation 34, but personally I do not find it discomforting on the roadway, though it is slightly discomforting at certain places on the footpath.

Installation 38 has given us a most interesting experience. The magnification in the refractors used is approximately 12; and with 500-watt lamps fitted, the glare was distinctly harmful. Observers expressed their opinion of it as "insufferable," "very objectionable," "objectionable," "discomforting." Visibility was distinctly impaired by it, and on that point the observers were unanimous. The 500-watt lamps were taken out and 300-watt put in. The glare was considerably reduced, and there is a marked improvement in visibility. On this point also the observers are unanimous; and it is interesting to note that it is possible with certain fittings to improve visibility by reducing the size of the lamps used with them.

Installation 39 is similar to Installation 34. The magnification is approximately six, and there is in consequence a reduction in the amount of glare.

Installation 44 is in Class D for minimum illumination, but in the lower Class E for mounting height. One would expect objectionable glare because of this; but it is absent. I shall be glad to have the views of the members on this.

Installation 46 is uniform in illumination, but is not depressingly so.

In viewing the installations, I have been struck by the fact that effective illumination is not always attractive illumination. I do not mean in the fittings used, but in the lighting itself. Let me compare Installation 9 (with a minimum illumination of 0·06 foot-candle and a maximum illumination of 2 foot-candles—ratio 1 : 33) with Installation 21 (with a minimum illumination of 0·1 foot-candle and a maximum illumination of 0·5 foot candle—ratio 1 : 5). Installation 9 gives one the feeling of brightness and cheerfulness. Possibly the reflection from the tramlines helps, but the minimum illumination (0·06 foot-candle) is a fair index of the value of the installation from a visibility point of view, and possibly 2 foot-candles may be considered also a fair index of its attractiveness. On the other

hand, Installation 21 is to me dull, flat, and uninteresting; but the minimum illumination (0·1 foot-candle) is again a fair index of the usefulness of the installation from the point of view of visibility. Objects can be seen on this road to practically infinity. The maximum illumination (0·5 foot-candle) would in my opinion also be a fair index of its attractiveness, as against 2 foot-candles in Installation 9. I should say Installation 9 is the street called "Happy," and Installation 21 the street called "Sombre." This raises an interesting point. I have not a feeling of drabness with other installations where there is the same or greater uniformity of lighting but where the minimum illumination is higher—Installations 38 and 46, for example.

Some people agree with me in thinking Installation 21 is drab, but some do not. This may be a difference in eyesight rather than a difference of opinion, for no one complains of the uniformity or drabness of Installations 38 and 46. Possibly lighting with a minimum below 0·1 foot-candle may be helped out in attractiveness by contrast of illumination. Lighting with a minimum above 0·1 foot-candle may not need that contrast. Let me state it in another way. Installations equal in minima illumination are equal in effectiveness. If they differ

Details of Experimental Installations.

1	2	3	4	5	5A	6	7	8	9	10	11		12	13
Installation No.	Illuminant.	Description of Fitting.	Consumption.	Arrangement of Lamps.	Appendix II. B.E.S.A. Specification.	Width of Carriageway.	Average Distance Between Lamps.	Average Distance Test Point to Two Nearest Lamps.	Height of Light Source.	Spacing-Height Ratio	Horizontal Illumination.		Ratio: Min. Max. Illumination.	Class.
											Min. in Foot-Candles.	Max. in Foot-Candles.		
					Fig.	Ft.	Ft.	Ft.	Ft.					
1	Elec.	Lantern with dome refractor	1000 w.	..	..	..	91	51	28 & 25	..	0·700	2·0	1 : 3	C
2	,,	Vitreous enamelled, globeless type, lantern with trough reflectors	750 w.	Staggered	2	26	226	114	25	9·0	0·065	4·0	1 : 62	F
3	Gas	Square copper lantern; preheater with four nozzles in line; medium size mantles	10 c.ft.	,,	2	33	82	45	13½	6·0	0·060	2·0	1 : 33	F
4	,,	Square copper lantern; earthenware reflector; 2-light burner; bijou mantles	3·5 c.ft.	One-sided lighting	5	29	96	54	13½	7·1	0·012	0·5	1 : 42	H
5	,,	Do. do.	3·5 c.ft.	Staggered	2	29	91	48	13½	6·7	0·016	0·5	1 : 31	H
6	,,	Square copper lantern; preheater with four nozzles in line; bijou mantles	7 c.ft.	,,	2	33	108	57	13½	8·0	0·020	1·0	1 : 50	G
7	,,	Inverted type, with half frosted and half clear globe; four medium mantles in circle	10 c.ft.	,,	2	33	80	44	13½	5·9	0·066	1·2	1 : 18	F
8	,,	Inverted type with clear glass bowl; four medium mantles in circle	10 c.ft.	,,	2	33	85	46	13½	6·3	0·050	1·7	1 : 34	F
9	,,	Square copper lantern; four medium mantles in line	10 c.ft.	,,	2	33	85	46	13½	6·3	0·060	2·0	1 : 33	F
10	Elec.	Prismatic glassware bowl; 2-way	75 w.	,,	2	18	95	48	13½	7·0	0·035	0·3	1 : 7	G
11	,,	Mirror reflectors	75 w.	,,	2	18	95	48	13½	7·0	0·033	0·4	1 : 11	G
12	,,	Swan neck; enamelled reflector	60 w.	,,	2	16	95	48	11½	8·2	0·014	0·27	1 : 19	H
13	,,	Ripple glass globes	100 w.	,,	2	16	95	48	13½	7·0	0·016	0·3	1 : 19	G
14	,,	Vitreous enamelled reflector with glare screen	100 w.	,,	2	18	84	43	15	5·0	0·014	0·8	1 : 57	H
15	,,	Copper lantern; dome refractor	300 w.	Centre lighting	4	72	105	64	28	3·7	0·100	0·5	1 : 5	E
16	,,	Do. do.	500 w.	,,	4	72	105	64	28	3·7	0·105	0·8	1 : 8	E
17	,,	Do. do.	1000 w.	,,	4	72	103	63	28	3·7	0·5	1·55	1 : 3	C
18	,,	Do. do.	1500 w.	,,	4	72	96	60	28	3·4	1·0	2·5	1 : 2½	B
19	,,	Do. do.	1000 w.	,,	4	72	109	65	28	3·9	0·335	1·6	1 : 5	D
20	,,	Do. do.	500 w.	,,	4	72	96	60	28	3·4	0·2	0·8	1 : 4	D
21	,,	Do. do.	300 w.	,,	4	72	105	64	28	3·7	0·100	0·5	1 : 5	E
22	Gas	Square copper lantern; four bijou mantles in line	7 c.ft.	Staggered	2	29	84	45	13½	6·2	0·050	1·0	1 : 20	F
23	,,	Square copper lantern; 5-light bijou mantles in circle, fed from roof	8·75 c.ft.	,,	2	29	78	42	13½	5·1	0·034	1·2	1 : 35	G
24	,,	Square copper lantern; directive glassware; four bijou mantles in line	7 c.ft.	,,	2	29	75	40	13½	5·5	0·065	1·0	1 : 15	F
25	,,	Square copper lantern; 4-light bijou mantles in circle; burner fed from roof	7 c.ft.	,,	2	29	100	52	13½	7·4	0·02	1·0	1 : 50	G
26	,,	Square copper lantern	7 c.ft.	,,	2	29	78	42	13½	5·8	0·035	1·0	1 : 29	G
27	,,	Square copper lantern	10 c.ft.	,,	2	29	78	42	13½	5·8	0·055	2·0	1 : 36	F
28	,,	Swan neck fitting; 5-light bijou mantles	8·75 c.ft.	,,	2	34	72	39	13½	5·3	0·05	1·5	1 : 30	F
29	Elec.	"Housing" lantern; enamel'd reflector	500 w.	,,	2	45	94	54	25	3·7	0·16	2·1	1 : 13	E
30	,,	Two-way band refractor	500 w.	,,	2	39	112	60	25	4·4	0·10	1·0	1 : 10	E
31	,,	Floodlight type*	..	..	..	..	..	..	..	..	..	..	..	..
32	,,	Dome mirror reflector fitted with diffusing screen	500 w.	Staggered	2	37	120	64	25	4·8	0·08	1·2	1 : 15	F
33	Elec.	Dome mirror reflector only	500 w.	,,	2	37	93	52	25	3·7	0·10	1·2	1 : 12	E
34	,,	Directive glassware, 2-way bowl	500 w.	,,	2	39	114	61	25	4·5	0·225	1·6	1 : 7	D
35	,,	Do. do. band	500 w.	,,	2	39	114	61	25	4·5	..	..	..	..
36	,,	Enamelled reflector with glare screen	500 w.	,,	2	40	109	59	25	4·3	0·14	2·5	1 : 18	E
37	,,	Dome refractor	500 w.	,,	2	40	117	63	25	4·6	0·105	1·7	1 : 16	E
38	,,	Refractor bowl, 2-way	300 w.	,,	2	40	106	57	25	4·2	0·225	0·45	1 : 2	D
39	,,	Directive glassware, asymmetric	500 w.	,,	2	40	112	62	25	4·5	0·300	0·75	1 : 2½	D
40	,,	Prismatic glassware	1000 w.	Centre lighting	4	67	112	63	27½	4·0	0·35	1·7	1 : 5	D
41	,,	"Housing" type lantern, large enamelled reflector	1000 w.	,,	4	46	114	60	27½	4·2	0·32	1·9	1 : 8	D
42	,,	Enamelled trough reflector	500 w.	Staggered	2	33	121	63	22	5·5	0·13	2·6	1 : 20	E
43	,,	Band refractor	1000 w.	,,	2	50	111	62	25	4·5	..	..	..	..
44	Gas	10-light medium mantles	25 c.ft.	,,	2	31	74	41	15	5·0	0·25	3·0	D Illn. 1 : 12	E mounting
45	,,	Similar to installation No. 44	..	..	..	..	..	..	..	..	..	..	..	..
46	Elec.	Lantern with dome refractor	1000 w.	,,	2	36	125	66	25	5·0	0·5	2·0	1 : 4	C
47	,,	Enamel'd reflector, opal lamps	300 w.	Centre lighting	4	72	96	60	28	3·4	0·08	0·8	1 : 10	F
48	,,	Ripple glass globes	300 w.	,,	4	72	130	74	28	4·6	0·043	0·3	1 : 7	G
49	,,	2-way band	500 w.	Staggered	2	34	120	63	25	4·8	0·12	0·85	1 : 7	E
50	,,	Mirror reflector	500 w.	,,	2	33	114	60	25	4·6	0·275	0·825	1 : 3	D

*. Impossible to give average distance between lamps, or spacing-height ratio, because they are not normally spaced.

in maxima illumination, they differ in attractiveness and only very slightly in effectiveness. The one with the greater contrast is the more attractive so long as the ratio of minimum to maximum illumination does not exceed about 40. Over that figure, contrast seems to me to become unattractive. All this, of course, is assuming that the installations are free from objectionable and discomforting glare. Brightness of the road surface brought about by the rays of light striking the roadway at oblique angles does help the effectiveness of the illumination on the road surface, but it is difficult to do this without creating tiring, harmful, or at least discomforting glare, which, in its turn, impairs visibility.

I have not given the coefficient for glare (G) in the table, as we have not a properly equipped photometric laboratory in the Lighting Department of Sheffield, and it is a slow, laborious, and unsatisfactory job measuring the illumination on the street itself, and arriving at the figures by calculation. But I did take out the figure for some of the more glaring installations. In no case did I find the value of "G" to be over 10. Paragraph 40 on p. 18 of the specifications is as follows:

> Such evidence as is available tends to show that, when the coefficient "G" does not exceed 10, glare is not likely to be objectionable.

I do not wish to anticipate the results of the careful investigations at present being carried out by the staff of the National Physical Laboratory on these installations, but I shall be surprised if it is not found that the paragraph referred to requires reconsideration.

An installation with a glare figure equal to 10 would be, I think, extremely glaring; and the visibility because of this glare would be much reduced.

Does the demonstration prove the specification? I saw confidently that it does. If you arrange the installations in the order of their minima illumination, you will find that they do form themselves into what would be your order of preference from the point of view of effectiveness. If you arrange them in their order of maxima illumination, you have, again from the point of view of effectiveness, obvious contradictions.

The glare clause might be made mandatory; in order to prevent or handicap an installation with a high minimum illumination and considerable glare; and certainly something should be done to prevent an installation such as No. 4 coming within the specification.

I would suggest also for consideration the change of distance between the lamps from "actual" distance to "effective" distance, as already explained.

I submit that on the whole the specification has come through the test of this demonstration creditably; and it should be put into operation in every city and town in the country. If this is to be done properly, lighting departments will require to be much better staffed and equipped in the future than they are now.

The President Congratulated.

Councillor R. H. MINSHALL (Chairman of the Sheffield Lighting Committee) congratulated Mr. Colquhoun on his election as President, and repeated the good wishes of the Lord Mayor. He said he would also like to be permitted to express his pleasure at being able to welcome the Association to Sheffield. It had been his privilege a year ago at Brighton to extend to them an invitation which he was glad they had accepted. He was delighted to move a vote of thanks to the President for his address, which, together with the practical demonstration of street lighting, would, he felt sure, be most valuable alike to lighting engineers and to lighting authorities. He was aware that the members of the Association were faced with a great problem—namely, the line of demarcation between glare and useful lighting. He did not suppose the problem ever would be solved to the satisfaction of everybody. One of the best definitions of glare that he had heard was over forty years ago, when listening to a lecture by Oscar Wilde, on "The House Beautiful." Wilde said: "Glare bears the same relationship to light that noise does to music." This, of course, would not help them to a solution of the problem; but it did give them an idea of the difficulty they were up against. In moving the vote of thanks, he would like to endorse what the President had said with regard to the need for proper staffing and equipping of lighting departments. As Chairman of a Lighting Committee, he apologized; it was not his fault. [Laughter.] What they should do was to get the Chairmen of the Finance Committees to come along to the meetings. At any rate, he hoped the conference would do something to move public opinion. He felt that there were lighting authorities in the country who had not yet risen to a full realization of what the work of the public lighting engineers was. He himself had heard a gentleman speak of them as only "glorified lamplighters." In Sheffield, at least, the work which the Association were doing was appreciated. The importance of good street lighting was fully understood. He congratulated the President upon his election to the chair, and the Association upon having chosen a worthy successor to those who had gone before; and he moved a hearty vote of thanks to Mr. Colquhoun for his address.

Mr. C. S. SHAPLEY (Leeds), in seconding the vote, agreed that insufficient attention had in the past been given to the important subject of public lighting; but there had of late been a tremendous increase in the efficiency of street lighting generally. Motoring up and down the country, he had observed a very marked improvement in this respect; and he thought that their Association could take some little credit for this, because they had been working assiduously for five years in pointing out, not only to their Chairman but to each other, their deficiencies. Their aim was to bring their lighting to the highest pitch of perfection; and he congratulated the President upon what he had done towards the accomplishment of this high ideal.

The PRESIDENT thanked the members for the vote, and expressed the hope that they would find the practical demonstration of street lighting more interesting than the address.

Tests of Street Lighting.

Mr. STILES, of the National Physical Laboratory, Teddington, said that when the National Illumination Committee of Great Britain heard of the street lighting demonstration that was being arranged in Sheffield in connection with the conference, they thought it would be a favourable opportunity of carrying out some tests. As a result of this, a special letter had been addressed by Sir Joseph Petavel to members, inviting them to take part as observers in a special series of tests; and he was pleased to be able to say that about forty had expressed their willingness so to act. The letter to which he had referred contained a fairly adequate description of the tests; and all it was necessary for him now to do was to explain one or two points where error might creep in and give a general indication of the arrangements. There were two separate tests. In Test A, they were asked to appraise the visibility of some ten installations according to an arbitrary scale of numbers ranging from zero to 5. This scale was supposed to be used in such a way that the best visibility would be placed at 5, and the worst at zero; the remainder being placed in their appropriate position. The second part of the first test required the observer to find the position at which the glare from a street lamp was at the maximum. In carrying out these tests, it was obviously not practicable to let the observer wander about all round the installation; and so his movements were being restricted for the second part of the test to the middle line of the street. In finding the position of maximum glare, he was asked to walk down the street and keep his eyes straight to the front, and at their own level. Having found the position where the sensation of glare appeared to him to be at the maximum, he would remain there for perhaps half-a-minute, and judge the installation on the basis of the glare he was experiencing. The installation of the ten which was most glaring would be given the highest number. The estimated position of maximum glare would be arrived at by counting paces, in accordance with a diagram to be provided. Test B was much more elaborate in general appearance, but he would not regard it as more important than, if as important as, Test A. What it was desired to do was to cull the experiences of lighting engineers, and get the opinions of a large number. This obviously could not be done in the laboratory, but only on an occasion like this. For Test B a series of ten black discs would be displayed in turn, on a special stand, at each of the installations they were testing. Each disc would be exposed for 30 seconds; and the number of the disc would be called out by an assistant. If the observer was able to discern the contrast spot on the disc, he would note the position in the appropriate place on a card to be provided. If the observer could not detect the contrast spot, a cross would be entered on the card. The position of the observer had been computed by calculation to be that at which glare was most acute; and it would be interesting when they had the final results to compare the positions which the observers estimated in Test A to show the maximum glare with the positions computed for the other test. Observers would be asked to make all their entries on the card independently of other observers, and to postpone discussion on the tests until the measurements were completed.

Non-Manual Control of Lamps.

Papers were then read by Mr. E. H. Horstmann, on "Non-Manual Control of Public Street Lighting," and by Mr. Ernest E. Sharp, on "Non-Manual Control of Public Electric Lighting."

A report of Mr. Horstmann's paper and of the discussion which followed it is held over to a subsequent issue.

The Institution of Gas Engineers.

Mr. WALTER T. DUNN (Secretary of The Institution of Gas Engineers) said he wanted to express the regret of the President of the Institution, Mr. John Terrace, at his inability to arrive in Sheffield in time for the commencement of the proceedings. He (the speaker) wished to congratulate the Association on the excellent progress which it had made in the short time of its existence. This proved the necessity for such an organization. He would remind them of the great part played by gas in connection with public lighting. It was the general opinion of gas engineers that there was a great deal more yet to be done by it in this direction. With regard to the "B.E.S.A." specification, they all owed much to Mr. Robert

Watson, who was present, for the vast amount of attention that he had devoted to this subject. He had been at it for some ten years; and he was going to America to attend the International Illumination Conference as the delegate of The Institution of Gas Engineers, in order to give people there the benefit of his great experience. Sheffield was to be congratulated upon its practical plan for trying-out the specification which had been drawn up.

LUNCHEON WITH THE GAS COMPANY.

At one o'clock the Tuesday morning session closed; and the members and delegates proceeded to the Cutlers' Hall, where, along with a number of distinguished visitors (the total number who sat down being about 200), they were the guests at luncheon of the Chairman and Directors of the Sheffield Gas Company, who proved themselves the most generous of hosts. Lieut.-Col. H. K. STEPHENSON, D.S.O., LL.D., D.L., J.P. (the Chairman of the Company), presided; and those present, outside the Association, included the Lord Mayor, Councillor Frank Thraves (Chairman of the Watch Committee), Councillor R. H. Minshall (Chairman of the Lighting Committee), Councillor E. G. Rowlinson, Alderman C. W. Beardsley, Alderman A. J. Blanchard, the Bishop of Sheffield (Dr. Hedley Burrows), Col. G. E. Branson, and Mr. Robert Leader. Mr. Ralph Halkett (General Manager and Secretary of the Company) was also present.

After the CHAIRMAN had submitted the Loyal Toast,

THE CIVIC AUTHORITIES.

Dr. BURROWS proposed "The Civic Authorities." They expected, he said, of their civic authorities, certain things. They expected local patriotism; and this they had in Sheffield (as well as in many other places represented there that afternoon) to a very high degree. Then they expected their civic authorities to possess good business habits. But there was also something else they expected of them, and that was that they should have long-suffering patience with complaints. Every complaint that could be made was brought against their civic authorities. A well-known literary man said recently that, if one wanted to make a thing a success, one should make it local. There was a great deal in this saying. That was why their civic authorities were so successful, and were the envy of every other nation. In Sheffield the local authorities reflected admirable qualities; and all present must wish them well. The Lord Mayor was a remarkably hard worker.

FROM DARKNESS TO LIGHT.

The LORD MAYOR, in response, said they in Sheffield prided themselves on the fact that they possessed some of the best and most up-to-date municipal undertakings that were to be found anywhere in the United Kingdom. He had sitting on his left the Chairman of the Sheffield Gas Company; while facing him was the General Manager of the Corporation electricity undertaking. He was not sure that the competition which was taking place between them in regard to the lighting of the city was not good for the citizens in general. He was of opinion that if they were dependent solely upon one or the other illuminant, there would not be displayed the initiative that one saw now. It was, in fact, all to the good that they should have these two services, for thus it had come about that, instead of being one of the darkest and worst lighted places in the United Kingdom, as was the case some few years ago, Sheffield was now well on its way to become the best lighted.

EARLY SUPPORTERS.

Councillor T. H. HURST (Vice-Chairman of the Lighting Committee of the Newcastle-upon-Tyne Corporation), whose name was also coupled with the toast, remarked that the work of members of civic authorities did not always meet with the recognition that it deserved. Newcastle was one of the first authorities to join up with the Association of Public Lighting Engineers. They did not believe in going along in narrow ruts. When the new Lighting Superintendent took over the duties, the city was very dark; but Mr. Davison had done wonders, because he had been associated with this organization, and had been able to obtain at the meetings expert advice, by which Newcastle had benefited, so that it had become one of the best lighted cities in the kingdom. He (the speaker) had attended two or three conferences of the Association in various parts of the country; and he had noticed that the local gas companies had always entertained them royally. The Sheffield Gas Company had been no exception to this rule; and he hoped it would not be long before they held another conference in the city.

AN ASSOCIATION THAT HAS COME TO STAY.

Lieut.-Col. STEPHENSON said it was with great pleasure that he rose to propose what he felt he ought to describe as the toast of the day—"The Association of Public Lighting Engineers," in whose honour this gathering had been arranged. Although this Association was young in years, it had, he was sure—especially now that it had received its licence of incorporation—come to stay; and it was, he was satisfied, doing very important and very excellent work. There was nothing which was more important to the safety, comfort, and amenities—in fact, to the general well-being—of a great city than its artificial lighting during the hours of darkness. There was also nothing more likely to stimulate good results than an Association like this of experts who met together to exchange views—to teach, and to learn from, each other the latest improvements and ideas. The toast was one which deserved to be received with special cordiality in a Sheffield assembly. As the Lord Mayor had mentioned, the lighting of Sheffield some years ago left a great deal to be desired; and he knew of no city or town which had benefited more from the appointment of a Public Lighting Engineer than had Sheffield. ["Hear, hear."] There was much excuse to be made for the bad lighting of Sheffield some four or five years ago. They knew that during the war artificial lighting was practically forgotten. Then when the war was over a sort of apathy prevailed, and there was hesitation in restoring the lighting even to what it was before the war. A great many lamps were left unlighted; and those which were in service were in a rather decrepit condition. So much, indeed, was this the case that in 1923 he made, on behalf of the Sheffield Gas Company, what the newspapers described as a "sporting offer." This was to take over the lighting of some portion of the city, and show what could be done with the aid of up-to-date lamps and appliances. For various reasons this offer was not accepted; but the Company were allowed, as an act of grace, to demonstrate, at their own expense, the value of some of the changes they proposed, by converting and maintaining a number of old lamps, free of charge. The improvements were extraordinarily satisfactory; and, in 1924, he again called public attention to the still greater improvements possible if new lamps fitted with reflectors were employed. Whether his offers and suggestions, coupled with Mr. Halkett's practical demonstrations, had anything to do with it, or whether it was a mere coincidence, he must leave to others to decide; but it was a matter for rejoicing that, within a very few months, Sheffield's first Lighting Engineer was appointed in the person of Mr. Colquhoun, the present President of the Association. Since that day the lighting of the Sheffield streets had steadily improved, until to-day they were able to meet the Association with a blush of pleasure, instead of with the blush of shame that they would have suffered had the members visited Sheffield a few years ago.

SAVING REPRESENTED BY IMPROVED METHODS.

It would be seen, therefore, that under the guidance of a member of the Association, Sheffield had been transformed from a city of darkness to one of light, though, as Mr. Colquhoun would himself be the first to admit, there was still room for improvement. Whatever might have been the attitude of the municipal authorities in the past, to-day they, through the Lighting Committee, realized that, if the best return for their expenditure on lighting, whether by gas or electricity, was to be obtained, a full-time and fully qualified expert must be employed. So far as gas was concerned, improved methods and more light did not necessarily involve the use of more gas; for in 1909 they had in Sheffield 11,344 street lamps, each consuming on the average some 18,000 c.ft. of gas per annum. In 1913, they had so far improved that they had 12,270 lamps, each of which consumed rather less than 17,000 c.ft. per annum; while in 1927, as a result of the improvements which had been effected under Mr. Colquhoun's management, they had increased the number of lamps to 14,500, giving incomparably better illumination; but each lamp consumed, on an average, less than 14,400 c.ft. When to this he added that the Company were now selling—he might almost say giving—their gas to the Corporation at 1s. per 1000 c.ft., as compared with 10d. in 1913, it would be seen that, whatever else was responsible for the increase of rates in Sheffield, it was not gas. For although the gas costs 2d. per 1000 c.ft. more than in 1913, the decrease in consumption per lamp, due to improved methods, practically wiped out this increase in price. Although, of course, he (the speaker) was primarily interested in gas, he was not unaware that the Association was no less interested in electricity. He believed there was plenty of room for both; but given fair play—as he was sure it would be by the Sheffield Corporation—he was sure that gas would always hold its own, especially in the matter of street lighting, for which he did not think electricity could compare in price with gas. If, as he believed was the case, Mr. Colquhoun's advice on electric lighting was as good as it was on gas lighting, and the Lighting Committee would give him a free hand, Sheffield ought soon to be one of the best lighted cities in the world. The Board of the Sheffield Gas Company, and the General Manager, Mr. Halkett, to whose work Sheffield owed more than he (the speaker) could say, were delighted to have this opportunity of welcoming the Association, and of congratulating Mr. Colquhoun on his election as President He had much pleasure in giving them the toast of "The Association of Public Lighting Engineers," coupled with the name of Mr. Colquhoun.

FALSE AND REAL ECONOMY.

The PRESIDENT, in reply, said he heartily agreed that there was still great room for improvement, particularly in the lighting of courts, &c. Somewhere between 300 and 400 had been lighted during the past year; but there still remained 1500 unlighted—a state of affairs which was not a credit to the city. It was, of course, very largely a question of ways and means. Considerations of economy entered in; but unfortunately economy was always measured in terms of money. It was a remarkable fact that the number of accidents of all kinds—street accidents and industrial accidents—was in exactly inverse ratio to the hours of daylight. While there had been a most limited increase in the number of accidents during the day, there had been a much larger increase during the hours of artificial light. When considering economy in terms of money, he would ask local authorities at the same time to take into account economy in time, economy in speed, and the still more important saving to life and limb. The Association of Public Lighting Engineers had been formed in order that they might educate one another; and it was also proposed that they should educate the members of local authorities. Whatever might be the opinion with regard to economy in money in the past, there had certainly been undue economy in the expenditure of thought on the subject. He would appeal to them all to give greater attention to so important a matter. He would urge them to look at the lighting departments throughout the country, and ask themselves seriously if they were staffed and equipped in such a way that would entitle one to expect reasonable efficiency.

A 46 P.CT. INDUSTRIAL LOAD.

Alderman GEORGE CLARK, J.P. (Chairman of the Chesterfield Corporation Gas Department), proposing the health of the Chairman,

remarked that Colonel Stephenson was at the head of an undertaking turning out more than 5000 million c.ft. of gas per annum, an undertaking which was selling gas at from 1s. to 2s. 9d. per 1000 c.ft., and an undertaking which was part of one of the biggest industries of this country—the great British gas industry. It was an industry which required no less than £179,000,000 of capital, which was paying £15,000,000 a year in wages, and was employing 100,000 men. As part of this vast industry, the Sheffield gas undertaking was managed, as a great commercial concern should be, by the leading business men of the city, ably supported by one of the best gas administrators in England—Mr. Ralph Halkett. ["Hear, hear."] A remarkable thing, and one which was greatly to the credit of the Sheffield undertaking, was that they were disposing of their gas to the extent of 46 p.ct. for industrial purposes. This spelt fuel economy and less smoke. The gas industry was progressing year by year under the leadership of one of the ablest men—Sir David Milne-Watson. On behalf of those present, he wished to thank Colonel Stephenson and the Directors of the Sheffield Gas Company for their hospitality that day.

The CHAIRMAN, in acknowledgment, said it had been a great pleasure to the Board and to their General Manager to meet the members of the Association in such pleasant circumstances. He hoped it would not be long before they visited Sheffield again. [Applause.]

SHEFFIELD STEEL WORKS VISITED.

A busy but enjoyable afternoon was spent on Tuesday in visiting some of the largest of the Sheffield steel works. As it was anticipated that about 150 delegates would take part, it was decided that the most convenient method would be to arrange three parties. Thus one party spent the time at the River Don Works of Vickers Armstrong, Ltd., another at the Hecla Works of Hadfields, Ltd., and the third at the works of John Brown & Co., Ltd. The parties were conveyed to the various destinations in Corporation motor-'buses, and were then taken through the various departments by officials of the firms, who carefully explained the various processes.

STREET LIGHTING EXPERIMENT.

Though various unofficial inspections took place during the meeting, it was at 10 o'clock on the Tuesday night that the members assembled outside the Town Hall, where motor-'buses (again placed at their disposal by the Corporation) were in readiness to take them on an organized tour of the different streets in which trial lighting had been arranged by the President (with the full approval of his Committee and the interest of the Department of Scientific and Industrial Research and of the National Physical Laboratory) to demonstrate in a practical form the standard specification for street lighting prepared by the British Engineering Standards Association. The inspections, and the tests to which reference had been made by Mr. Stiles during the morning's proceedings, were, it may be said, responsible for depriving the majority of those attending the meeting of a good deal of sleep. It will be recalled that the standard specification for street lighting formed the subject of a paper submitted to the meeting of the Association at Brighton last year by Messrs. Robert Watson, L. B. W. Jolley, and J. M. Waldram jointly, which was reproduced in the "JOURNAL" for Sept. 21, 1927 (pp. 689-95). At that time the suggestion was put forward that the proposals contained in the specification should be submitted to a practical test; and the Sheffield experiment was the result.

In order to make the practical demonstration as thorough as possible, no less than eight miles of streets in different portions of the city had been experimentally lighted with gas or electricity; and though the different lighting units employed varied enormously in illuminating power, it was agreed that, speaking generally, a high standard of public lighting had been reached. Both the time of year and the prevailing atmospheric conditions, however, somewhat militated against full appreciation of the results. In addition to the visits of the members of the Association, the lighting was inspected by various scientific bodies interested in the question—among them the British Engineering Standards Association and officials of the National Physical Laboratory, Teddington.

A number of public lighting firms (including the following on the gas side) rendered assistance by the loan of various appliances; while the Corporation of the City of Sheffield, through their Watching and Lighting Committees, spared neither effort nor expense to make the experiment a success. In his address, the President urged the members to bear in mind the fact that the purpose was to demonstrate the specification, and not to demonstrate the merits or demerits of any particular maker's goods.

Bland Light Syndicate, Ltd.,

25, Grosvenor Place, London, S.W.

This firm loaned a new type of "Bland" street lamp cluster for the demonstration (patent applied for No. 4015 of 1928). This cluster is made of magnesia, and is provided with a specially shaped magnesia disc placed exactly 1⅛ in. from the ignition-point of each nozzle. It is said to be impossible to make this burner light-back, and that a three-light cluster of No. 2 mantles gives a duty of 150 candles measured at the horizontal, and 190 candles at 10° to 15° below the horizontal, at a consumption of 6·5 c.ft. of gas per hour at 30-10ths pressure.

Foster & Pullen, Ltd.,

Avil Works, Crossley Hall, Bradford.

The exhibit of this firm consisted of thirty square pattern lanterns, with four-light inverted burners, designed to give illumination equal to Grade F of the British Standard Specification.

Holophane, Ltd.,

Elverton Street, Vincent Square, Westminster, S.W.

A section of street containing square type gas lanterns was equipped with the new Holophane prismatic directional refracting plates, an illustrated description of which will be found on another page of this issue of the "JOURNAL." It was the first occasion on which this interesting new development in gas street lighting had been publicly demonstrated.

Lighting Trades, Ltd.,

30-31, Farringdon Street, London, E.C.

Six square copper lanterns and six "Silva" lamps, each fitted with a five-light bijou "Renown" magnesia superheater burner, were provided by Lighting Trades, Ltd. "Renown" burners created considerable interest among the lighting engineers when they were displayed at the Brighton exhibition in connection with last year's conference; and the advantages then claimed for them have, it is said, since been fully realized. These advantages briefly are: Elimination of corrosion; and the absence of wire gauzes or specially constructed nozzles, resulting in considerably reduced labour charges for maintenance and a high standard of lighting efficiency.

Parkinson & Cowan (Gas Meters), Ltd.,

Bell Barn Road, Birmingham.

In one part of the experimental area there were twenty "Parkinson" No. 840 Model "B" 18-in. square lanterns. These lanterns were fitted with self-contained four-light burner sets, having outside gas and air adjusters, and No. 1 bijou size mantles. The preheaters were metallized; this treatment having been found very effective in preventing corrosion and the accumulation of deposit. Another point was illuminated by means of five "Parkinson" "1100" Series lamps. These were of the suspension pattern, constructed throughout of copper sheet, polished finish, with enamelled steel reflectors, outside gas and air adjusters, and ten No. 1 bijou size mantles.

William Sugg & Co., Ltd.,

Ranelagh Work, Chapter Street, Westminster, S.W.

Thirteen of this firm's ten-light "Rochester" suspension lamps were fitted on wrought-iron barrel swan-necks. These lamps were used with globes plain in the top half and frosted in the lower half. There were also twenty-four light upright "Littleton" lamps—ten fitted with all-clear globes, and the remainder with globes clear in the top half and frosted in the lower half.

WEDNESDAY'S PROCEEDINGS.

Before the members re-assembled for the conference in the Town Hall on Wednesday morning, a number of them attended at the city war memorial in Barker's Pool, where the President deposited a wreath of laurels, carnations, and lilies on behalf of the Association.

LOSSES BY DEATH.

On the resumption of the business proceedings, the PRESIDENT remarked that during the past year the Association had lost two very distinguished lighting engineers. One of them was Mr. Dickinson, of Liverpool, who had looked forward to occupying the chair some time in the future. He was an outstanding electrical engineer, greatly interested in street lighting; and he was still more an outstanding gentleman. ["Hear, hear."] Then the profession of illuminating engineers had suffered a grievous loss by the death of Mr. Leon Gaster, founder and Secretary of the Illuminating Engineering Society. His work would be remembered with gratitude.

As a mark of respect, the members stood silently in their places.

NON-MANUAL LAMP CONTROL.

The meeting then proceeded to the further discussion of the two papers on non-manual control of gas and electric street lamps, which had had to be adjourned on the previous day.

REQUIREMENTS OF PEDESTRIANS, MOTORISTS, AND RATEPAYERS.

Councillor F. THRAVES (Chairman of the Sheffield Corporation Watch Committee) followed with a paper on "What the Public Want from a Street Lighting Department, as Pedestrians, as Motorists, and as Ratepayers." Before reading the paper, the author said he would like to take the opportunity of congratulating Mr. Colquhoun upon his appointment as President, and to assure him that the people of Sheffield felt he had earned this position.

A summary of the paper, and of the discussion upon it, will be published in due course.

ANNUAL DINNER OF THE ASSOCIATION OF PUBLIC LIGHTING ENGINEERS.

VISIBILITY.

The final paper of the meeting (which it is also necessary to hold over until a future issue of the "JOURNAL") was contributed by Mr. J. M. WALDRAM, B.Sc., A.C.G.I., who took for his subject "The Visibility of Objects in Artificially Lighted Streets," and accompanied what he had to say by a large selection of lantern slides.

A PEEP INTO THE PAST.

Mr. E. M. SEVERN (South Metropolitan Gas Company), who is Hon. Treasurer of the Association, also exhibited an interesting series of lantern slides illustrating various patterns of lamp brackets fitted up outside old houses.

LIST OF OFFICERS.

The SECRETARY (Mr. W. J. Liberty) reported the result of the ballot, as follows:

President.—Mr. J. F. Colquhoun, Sheffield.

Vice-President.—Mr. N. Wright, Bournemouth.

Council.—Messrs. W. H. Chapman, London; H. Davies, Chesterfield; R. Davison, Newcastle-upon-Tyne; S. B. Langlands, Glasgow; R. Mason, Birmingham; C. S. Shapley, Leeds; M. H. Wardle, Liverpool; T. Wilkie, Leicester; and C. I. Winstone, London.

Hon. Editor.—Mr. E. J. Stewart, Glasgow.

Hon. Treasurer.—Mr. E. M. Severn, London.

VOTES OF THANKS.

The authors of the papers were heartily thanked for their contributions, on the proposition of Mr. BEVERIDGE, seconded by Mr. M. H. WARDLE (Liverpool).

Alderman JOSEPH TAYLOR (Bolton) moved, and Mr. CRAMB seconded, that the thanks of the conference be given to the Lord Mayor and Corporation of the City of Sheffield for having so kindly placed at the disposal of the Association the Council Chamber for the meetings, and motor-'buses for the various visits.

Mr. C. C. PATERSON said that the Association had always been extraordinarily fortunate in the choice of its Presidents. It was his pleasant duty to propose a very cordial vote of thanks to the retiring President, Mr. Cramb, for his services to the Association during his year of office. Mr. Cramb had placed his ability and capacity for hard work, his geniality, tact, and great personal influence unreservedly at the disposal of the Association.

Alderman JOHN GORDON (Liverpool) remarked that Mr. Cramb was leaving the position he had just vacated better than he found it. He had pleasure in seconding the vote.

Councillor T. ADAMS (Edinburgh) said that public lighting was undoubtedly one of the most important items in connection with municipal administration; and the problems arising out of it appeared to be getting more and more complicated. For guidance towards a solution, everyone would look to the Association. He proposed a vote of thanks to the Council and officers for the work done by them during the past year.

Councillor MINSHALL seconded the vote.

Mr. CRAMB said he had tried to do his best as President; and he did think they had made some progress. It was a new Association, and therefore required constant attention on the part of the President and Council to ensure success. It had done remarkably good work; and in filling a big gap it had justified its existence.

The LORD MAYOR declared that they in Sheffield had been only too pleased to do all they could to make the conference successful and enjoyable.

BOURNEMOUTH NEXT YEAR.

Councillor SUTTON (Bournemouth) said he wished to offer the Association a cordial invitation to visit Bournemouth for the purpose of their conference next year. If the invitation was accepted, he could assure them that all possible would be done to make the visit a happy one.

A DRIVE TO BUXTON.

Wednesday afternoon was devoted to a delightful drive (again in motor-'buses kindly placed at the disposal of the members by the Corporation) to Buxton, where a party of more than 150 were the guests of the Lord Mayor of Sheffield at tea in the celebrated Buxton Hydro. The Mayor of Buxton was also present to extend a welcome to the visitors. The day was gloriously fine; and the drive of 27 miles, through some of the finest scenery of the Midlands, from Sheffield to Buxton, which is situated at a level of more than 1000 ft. above the sea, was an experience that will long be remembered by those who were fortunate enough to participate. On the return journey Haddon Hall and Chatsworth were passed; the route taken being through Bakewell. It was a happy party; but obviously no one was happier than the Lord Mayor of Sheffield, who is so fortunate as to find his greatest pleasure in giving pleasure to others.

ASSOCIATION DINNER.

The formal proceedings of what was on all hands agreed to have been a delightful as well as a useful conference were brought to a close on the Wednesday evening by the annual dinner of the Association, which took place in the Grand Hotel, with the PRESIDENT in the chair. There were about 140 present; and among the guests were the Lord Mayor of Sheffield, Mr. Ralph Halkett (General Manager and Secretary of the Sheffield Gas Company), Councillor R. H. Minshall, and Mr. John Terrace (President of The Institution of Gas Engineers). After the honouring of the Loyal Toast,

REMARKABLE PROGRESS.

Alderman JOHN GORDON (Chairman of the Liverpool Corporation Lighting Committee), proposing "The Association of Public Lighting Engineers," said it was wonderful to see how much had been accomplished during the short time the organization had been in existence. Already the membership had reached about 160; but they should be able to double that within the next twelve months, because public lighting was of continually growing importance. He had attended all the conferences of the Association; and he did not know of any that had come up to the present one. Obviously, lighting cost money; and they must be certain to give the best results for the amount that was available for the purpose. There was a great deal of work for them to do; but he was sure they could do it, if only they got the necessary money. They had been highly fortunate in their Presidents; and he also thought that Mr. Liberty had done excellent work for the Association, and deserved the best thanks they could give him. ["Hear, hear."]

THE "B.E.S.A." SPECIFICATION.

Mr. A. C. CRAMB (Borough Electrical Engineer, Croydon), the immediate Past-President, in the course of his response, remarked that

one heard a lot about the great number of Associations that had been formed during recent years; and it was quite fair to ask what was the justification for their existence. In the case of their own Association, in the first two or three years it might have been difficult to put up a real justification; but he felt that now it could be done. Last year the "B.E.S.A." Specification made a landmark in public lighting. It was an excellent idea on the part of Mr. Colquhoun and the Corporation of Sheffield to give a practical demonstration of what this specification really meant. It had been invaluable, and of itself justified the existence of the Association, without anything else at all. Progress could only be made by the experts getting together and thoroughly going into the matter. They had been fortunate in having the assistance of some very able men from the National Physical Laboratory and other places. Combination of their efforts with the practical work of the lighting engineer was essential. He felt that big progress was going to be made in public lighting; but they must not run away with the idea that the chief aim of the Association was to produce the greatest lighting of the streets. The real object of the lighting engineer was to give the illumination which best met the requirements at the lowest possible cost. A difficulty that the Association laboured under was the small rate of subscription which had been fixed.

Good Lighting a Good Investment.

Alderman JOSEPH TAYLOR (Chairman of the Bolton Corporation Lighting Committee), who was entrusted with the toast of "The Corporation of Sheffield," remarked that the Lord Mayor had referred on the previous day to the number of courts and alleys in the city which remained unlighted. In Bolton, when a citizen sent in a request for any court, alley, back lane, or byway to be lighted, a Sub-Committee made a visit of inspection to the spot. The President, along with other lighting engineers, required all the financial assistance that could be rendered. It was cheaper to safeguard life than to incur fatal accidents. The Gas Company in Sheffield, as all of them knew, was a remarkably progressive one.

Conferences Not "Joy-Rides."

The LORD MAYOR OF SHEFFIELD, in acknowledgment, said that the city was turning out to-day more steel than in 1913. There were more men employed in the steel works than in that year; and were it not for the 40,000 men dumped on them for war work, there would not be 25,000 unemployed to-day. Any members of the Sheffield Watch Committee or Lighting Committee who had attended that meeting of the Association would have been convinced that it was not a "joy ride," but a serious business proposition. He himself had attended conferences of one kind and another for over forty years; and never yet had he found one to be a "joy ride." It was only after the business was done that people enjoyed themselves, as they were fully entitled to do. [Applause.] He could assure the members that they would give Mr. Colquhoun, whom they were proud to have as their Lighting Engineer, all the moral and financial support that it was possible to afford.

"The President."

Bailie JAMES MACDOUGALL (Sub-Convener of the Glasgow Corporation Lighting and Watching Committee), submitting "The President," pointed out that Mr. Colquhoun had had five years' training in Glasgow under Mr. Langlands. Mr. Halkett and Mr. Terrace had also come from Scotland. The Association, though very young, was doing excellent work. The heavy death roll from accidents called for the utmost services on the part of the members. Local authorities should give all the help they could to lighting engineers in safeguarding life.

The PRESIDENT assured the members that it had been a very great pleasure to him to have them in Sheffield.

"The Visitors."

Councillor R. H. MINSHALL (Chairman of the Sheffield Corporation Lighting Committee), in proposing "The Visitors," expressed the opinion that the street lighting demonstration would make that meeting historic. Some of the lighting they had seen he hoped the Corporation would retain.

Mr. JOHN TERRACE (President of The Institution of Gas Engineers), responding, said the Institution were very closely interested in the problem of illuminating the streets. They had been dealing with it for a greater number of years than any other body. The Association of Public Lighting Engineers was a comparatively young organization, and its progress had been carefully watched and much admired by The Institution of Gas Engineers. The work done had been of an extremely useful character, and he had been greatly struck by the quality of the fare that had been provided for this meeting. The remarkable demonstration of the different grades of lighting under the "B.E.S.A." Specification, along with the address of the President, must have given the visitors a far better idea than they had before of the aims and objects of the Association. In the furthering of these aims and objects, The Institution of Gas Engineers would at all times be only too glad to give the Association every possible assistance.

A PRISMATIC REFRACTING PLATE.

For Gas Street Lighting.

Messrs. Holophane, Ltd., of Elverton Street, Vincent Square, Westminster, S.W., have designed a special prismatic refracting plate of heat-resisting glass for gas street lighting, to control the light rays from the superheated burner and give a lateral direction to the light distribution. These prismatic plates are designed for use with square type lanterns having single or multiple burners. They are easily adapted to existing lanterns, and, when fitted, are readily detached and replaced for maintenance purposes. For ordinary street lighting practice, two prismatic plates are fitted in a lantern—each axial to the direction of the street.

Square Type Gas Lantern equipped with the new Holophane Prismatic Directional Refracting Plates.

The Holophane refractor plates are designed with a prismatic optical system which controls 180° of the light rays emitted in the mid-zone, refracting the upwardly emitted light in a lateral direction, and giving a two-way directional lighting system of two main beams of an intensity of four to six times the candle-power of the burner. The prismatic plates as fitted do not affect the normal light distribution from the burner for the zone 0°-70° from the nadir; the control being obtained from the rays emitted horizontally and upward. The increase of candle-power intensity secured at the wide angles from 70° to 85° is therefore obtained from the light not normally useful for street illumination.

A section of street containing square type gas lanterns was equipped with these new Holophane prismatic directional refracting plates, by the Sheffield Corporation Lighting Department, for the conference of the Association of Public Lighting Engineers, which was the first occasion on which this interesting new development in gas street lighting had been publicly demonstrated.

Mablethorpe and Sutton Gas Company.

Upon few parts of the north-east coast have greater developments been witnessed of recent years than at the picturesque resorts of Mablethorpe and Sutton-on-Sea, which each season have been found to attract increasingly large crowds of visitors. With the extension of building operations in most directions, the demand has grown for extended gas supply, which is being afforded by the Company, whose statutory powers cover the two towns. The need for increased capital to cope with new developments is being met by the issue of 7000 £1 shares, carrying interest at the rate of 7 p.ct., and for these, which were recently offered by auction, there was spirited bidding; the script being taken up readily at from £10 to £10 5s. per lot. The Company have now a capital of £17,500, in addition to £3500 in debentures.

Gas Oil Prices.—Gas oil is quoted by the "Petroleum Times" this week at 6½d. per gallon in bulk, *ex* rail tank-car, *ex* wharf; 7d. per gallon, in barrels, *ex* store.

THE KENT-HODGSON SHUNT GAS METER.

By John L. Hodgson, M.Inst.Mech.E.

Origin of the Meter.

Some thirteen years ago, at the beginning of the war, the writer carried out a large number of tests on model propellers with the plane of rotation inclined at various angles to the direction of motion, in order to ascertain whether flight on the helicopter principle was practicable.* His conclusion, which still holds good, was that horizontal flight was possible, but that vertical flight was impracticable with a screw-supported machine using engines of the existing weight per horse-power. The model propellers tested were rotated by a small air turbine, the driving torque of which was determined by calibration in terms of the air pressure at the jet driving the turbine. It is from this turbine that the shunt gas meter has grown.

It was found during the above experiments that over a very large range of speeds the revolutions of the turbine were exactly proportional to the volume of air passed through the impact nozzles, and that it was only at low speeds, where the energy delivered to the turbine per second was small, that the constancy of the ratio of air volume to revolutions fell off. The reason for this is explained in the theory of the meter given at the end of these notes.

Being at the time interested in the bulk measurement of air, gas, and steam, the writer realized that the jet-driven turbine gave the simplest means of obtaining a counter record of the flows of all these fluids. He saw that in a turbine meter only one freely rotating shaft (apart from the counter train) had to be designed so that its frictional resistance to rotation would remain negligible after months of running. It has been his good fortune since the 1915 experiments to develop successful and accurate meters on the turbine principle for measuring each of the fluids referred to above.

The gas meter which has evolved after thirteen years of experience is illustrated in figs. 1, 2, and 3.

Description of Meter.

In this meter an orifice K is placed in the gas main, and this orifice diverts a certain proportion of the gas through a shunt circuit placed above the orifice, and in which the turbine T is placed. Gas impinges on to the turbine through two diametrically opposite nozzles J so that there is no side thrust on the bearings. The speed of the turbine is kept low (and hence the wear on the bearings reduced to a minimum) by means of a damping fan F which rotates in a chamber C fitted with baffles.

The weight of the turbine and the damping fan is carried by a float immersed in mercury M.† This enables strong and heavy and incorrodible materials such as Monel metal and "Staybrite" steel to be used in the construction of the turbine, and makes it possible for the meter to be used for measuring such gases as anhydrous ammonia.

The high-speed wheels of the counter train rotate in an oil bath from which a small amount of oil passes to lubricate the top bearing of the turbine shaft.

In order to prevent the deposition of moisture upon the inside of the counter glass, and to eliminate the friction of a packed gland in transmitting the revolutions of the turbine to the counter dials, the counter is placed in a sealed chamber, and a magnetic drive transmits the motion of the turbine to the counter dials after a suitable reduction in speed has been effected by means of the gearing in the oil bath. The permanent magnets used in this drive are made of cobalt chromium steel.

Fig. 1.—External View of Meter.

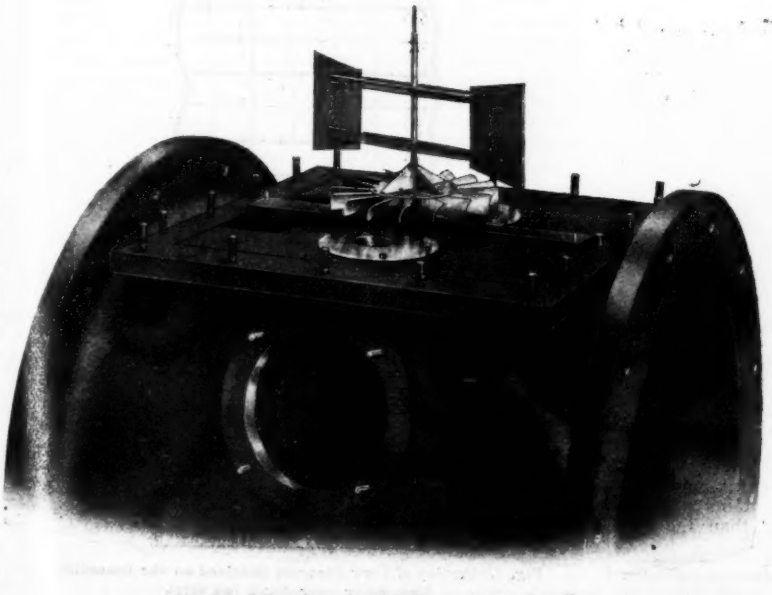


Fig. 2.—Orifice Nozzles, Turbine, and Damping Fan.

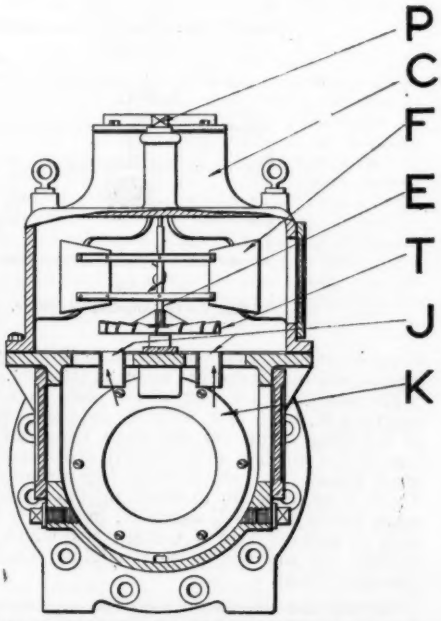


Fig. 3.—Cross-Sectional End Elevation of the Meter.

* See "Some Tests on Model Propellers": Proceedings of the Institute of Automobile Engineers, 1917, pp. 261-304.

† After a year's running in gas, a slight deposit will be found upon the surface of the mercury. Provision is made to enable this deposit to be removed without interfering with the mechanism of the meter.

The meter is suitable for the measurement of high-pressure gas if certain overload devices which are not described in these notes are added to it. There are many air meters of the same type working successfully at pressures of 100 lbs. per sq. in. and upwards.

THE QUESTION OF DEPOSIT.

The jets impinging on the turbine are reduced to two, the least number that will provide a drive without side thrust on the bearings. In this way the ratio of the area of the jets to the length of the jet walls is made as large as possible. It will be obvious that a $\frac{1}{32}$ in. deposit of tar on the walls of the nozzles will cause much more relative clogging of the discharge area if eight $\frac{1}{4}$-in. nozzles are used in place of two 1-in. ones. Actually the gas supplied from a modern gas-works for distribution is a very clean fluid, so that when the above meters are used as station meters no difficulty whatever is experienced from dirt in the gas. Where the gas is dirty, the large ratio of jet area to length of jet wall is of great value, as it enables the meters to run for considerable periods without attention or cleaning. To facilitate cleaning, large hand holes are provided, and the nozzles are made easily removable. It is found that the meter will run successfully when placed between a water gas plant and the relief holder, if the nozzles and the orifice are cleaned once a month. In the opinion of gas engineers who have used the meter for this purpose, the error in registration does not exceed 3 p.ct. at the end of the month immediately before the meter is cleaned.

The range of flow to be measured if the meter is placed between the plant and the relief holder is, of course, greater than it would be if the meter were placed further along the main; but as the meters will measure accurately down to one-tenth of the stated maximum flow* and also up to overloads of 100 p.ct., and respond almost instantaneously to changes in the flow, there is no point in putting them further along the main where the gas is cooler and the trouble from tar deposits very greatly increased. Where such trouble must be faced, oil sprays are fitted upstream of the meters to enable them to be kept clean without being continually opened up.

INSTALLATION OF METERS.

The standard method of installing the meter is shown in fig. 4. It will be seen that the meter is put in a horizontal

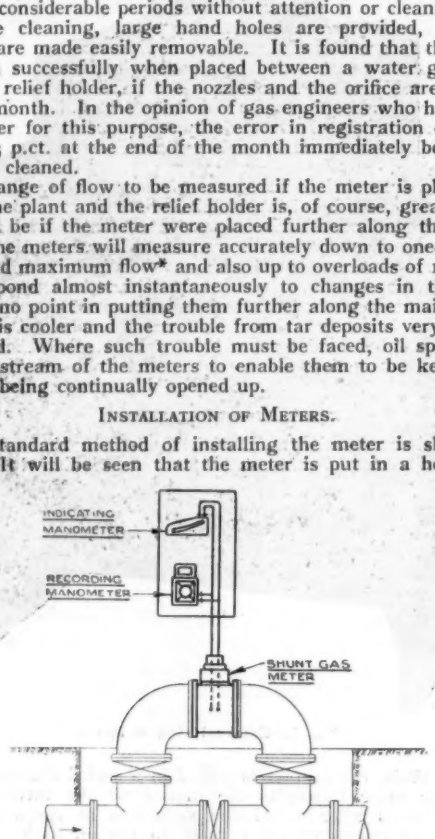


Fig. 4.—Installation of Meter.

by-pass between two 90° bends. No long run of straight pipe in which to instal the meter is required.

The meters for all diameters of main from 4 in. to 30 in. are exactly 2 ft. long, and, with the arrangement shown, the cost of installing them and the space taken up for the complete installation are less than for any other meter. The arrangement shown also provides efficient drainage for the meter. There is no objection to installing the meter in the open, but when this is done it is desirable, in order to prevent condensation, to enclose it in a wooden box which contains a small heating coil so as to keep it slightly warmer than the gas passing through it.

* At the stated maximum flow the loss of pressure across the meter is about 1½ in. W.G., and this loss of pressure varies as the square of the flow.

CHECKING THE ACCURACY.

A great feature of the meter is that its accuracy can be checked at any time by comparing the readings of a flow indicating manometer (see fig. 4) connected across the orifice in the meter with the counter readings obtained from the meter. The original calibration of the meter is usually against a standard drum meter. The meter can also be calibrated *in situ* in those cases where a drum type meter or a gasholder can be connected in series with it; the necessary change wheels being inserted in the counter train after such calibration. In either case the meters can be made as accurate as the drum type meter or holder against which they are checked. ***There is no difficulty whatever in calibrating to an accuracy of plus or minus 1 p.ct., and this accuracy can be maintained in practice, as it is possible to check the calibration at any instant by means of the flow indicating manometer connected across the orifice in the meter.***

FLOW INDICATION AND RECORDING.

The scale of the flow indicating manometer, which is illustrated in fig. 5, is equally spaced down to $\frac{1}{20}$ of full flow.

Fig. 5.—The Flow Indicating Manometer (curved tube type).

It will be obvious that the manometer illustrated can be used in a gas-works in many situations other than the above—for instance, in measuring air to purifiers, gas to districts, and so on.

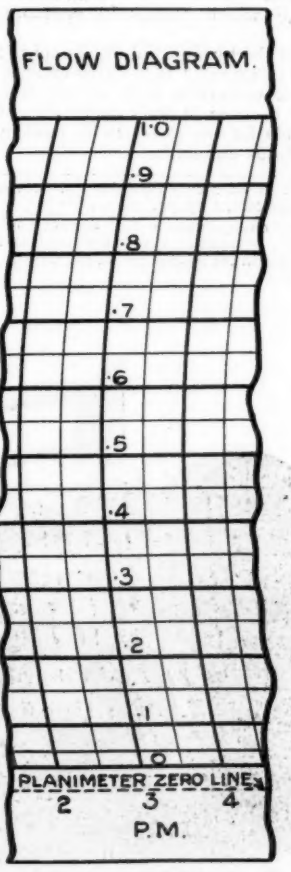


Fig. 6.—Portion of Flow Diagram Obtained on the Recording Manometer (reproduced full size).

If a diagram record of the flow is required, this can be obtained by means of the flow recording manometer (also shown in fig. 4), which is also equally spaced down to $\frac{1}{10}$ of the full flow. Fig. 6 shows the actual spacing of the diagram obtained on this recording manometer, reproduced full size. The internal parts of the recording manometer are of the simplest possible construction, so that there is nothing to get out of order. The uses of this flow recorder to a gas undertaking are also manifold.

The above flow indicating and recording devices, which form part of the meter installation, surpass in range and accuracy all other similar devices which are based on a differential pressure measurement.

A chart recording the temperature and the absolute pressure (*i.e.*, the manometric pressure *plus* the barometric pressure) of the gas on a flow basis (*i.e.*, not a time basis) can also be supplied. As this chart records the actual pressure and temperature at which each cubic foot of gas is passed, the temperature and pressure correction to be applied to the daily meter reading can be calculated from the mean of the chart readings.

If the flow is violently pulsating, as at the intake to a gas engine, a meter calibrated for steady flow conditions will read fast. Where a meter is required to measure such flows, it should be calibrated *in situ* against a drum meter or a gasholder, or an anti-pulsator should be fitted, or the meter should be moved farther away from the source of pulsation so that there is as large a capacity of pipeline as possible to steady the flow.

MAINTENANCE AND INCREASE OF CAPACITY.

The nozzles, turbines, and damping chambers for the meters for all sizes of main are identical—a fact which greatly reduces first cost and facilitates maintenance. This latter is in any case negligible, being but a few shillings a year, even for a 30-in. meter. Further, when it is desired to increase the maximum flow through the meter, it is only necessary to alter the size of the orifice and the gear ratio in the counter train. The meter and its by-pass valves and pipes do not require replacement. The standard maximum flows through the meters are designed for a gas velocity in the main of 35 ft. per second. Any smaller velocity can be taken as the maximum velocity without difficulty. If for any special reason it is desired to work at a higher maximum velocity, the meters can be designed so that gas velocities in the main up to 50 ft. a second correspond to their nominal maximum flow.

The writer hopes that the above notes, which describe an extremely simple, cheap, accurate, reliable, and adaptable meter, which is equally suitable as a station gas meter or for measuring the gas made by, or sold to, industrial plants, will prove of interest to gas engineers.

THEORY OF THE KENT-HODGSON SHUNT GAS METER.

The following is an approximate theory of the meter.

The velocity of discharge through the impulse wheel jets J, and through the orifice in the main K, can both be made proportional to

$$\left(\frac{p_1 - p_2}{W_2}\right)^{\frac{1}{2}} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (1)$$

where p_1 = pressure on the upstream side of the meter
p_2 = pressure on the downstream ,, ,, ,, ,,
W_2 = density ,, ,, ,, ,, ,, ,,

The linear velocity of the blades of the impulse wheel on which the jets impinge is proportional to N, the number of revolutions per minute. Hence the torque driving the impulse wheel is equal to

$$K_1 W_2 \left(\frac{p_1 - p_2}{W_2}\right)^{\frac{1}{2}} \left[K_2 \left(\frac{p_1 - p_2}{W_2}\right)^{\frac{1}{2}} - K_3 N\right] \quad . \quad . \quad . \quad . \quad . \quad (2)$$

where K_1, K_2, and K_3 are numerical constants.

Now, since W_2 is the density of the medium in which both the impulse wheel and the damping fan rotate, the torque resisting rotation is (if we neglect the slight fluid friction due to the mercury float) equal to

$$K_4 W_2 N^2 + q \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (3)$$

where q is the resisting torque due to mechanical friction.

Equating (2) and (3), and solving the resultant quadratic, we have

$$N = -K_5 \left(\frac{p_1 - p_2}{W_2}\right)^{\frac{1}{2}} + \sqrt{K_6 \cdot \frac{p_1 - p_2}{W_2} - K_7 \frac{q}{W_2}} \quad . \quad . \quad . \quad (4)$$

This equation shows that for flows higher than those at which the constant term $K_7 q/W_2$ becomes negligible in comparison with $K_6(p_1 - p_2)/W_2$, N is proportional to

$$\left(\frac{p_1 - p_2}{W_2}\right)^{\frac{1}{2}},$$

and hence to the volume per second passing in the main.

For these higher flows (4) reduces to

$$N = \left(\frac{p_1 - p_2}{W_2}\right)^{\frac{1}{2}} \left(K_6^{\frac{1}{2}} - K_5\right) \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (5)$$

The meters are so designed that the term $K_7 q/W_2$ is negligible below about $\frac{1}{5}$ of full flow, so that above this flow the revolutions of the turbine are exactly proportional to the flow.

THE PRODUCTION OF SMOKELESS DOMESTIC FUEL.—IV.

By JOHN ROBERTS, D.I.C., M.I.Min.E., F.G.S., Author of "Coal Carbonization: High and Low Temperature."

(*Continued from p.* 88.)

THE HELLER-BAMAG SYSTEM.

The Bamag-Méguin A.G., of Berlin, has been interested in more than one low-temperature process, but is now developing the system devised by Heller, and known as the Heller-Bamag process. In this also, oxidation is the main feature. Therefore it resembles the "Carbocite" system described in the preceding article. The retorts employed consist of the standard Bamag-Méguin Büttner surface coal dryers, which are largely used in the drying of lignites. As in the "Carbocite" system, one preheater serves two carbonizing chambers, the coal in the preheater being heated by the waste gases from the carbonizing plant; but, instead of travelling counter-current to the coal, the path of the waste gases is parallel to that of the coal. The revolving carbonizing drums are provided with internal tubes through which the preheated coal passes, and around which pass the heating gases from the furnace at the end of the retort. The coal is propelled through the tubes by the revolving motion, assisted by a system of rifling, whereby it takes a spiral path. The semi-coke is discharged at the end of the retort.

It is claimed both for the "Carbocite" and for the Heller-Bamag systems that throughputs of 1000 tons per day (on the raw coal basis) can be obtained with units such as those described. Should these claims be substantiated in practice, there is little doubt that the systems will prove profitable. Revolving drums, provided the mechanical construction is sound and efficient, are well adapted to ensure large throughputs.

OXIDIZED CHARGES FOR HIGH-TEMPERATURE WORK.

Since preheating coals in the manner described reduces the coking index of coals, and prevents the development of the plastic layer, a somewhat similar advantage in regard to improved heat penetration is to be expected in high-temperature practice in the use of oxidized coals, inasmuch as in both cases the low-temperature stage of plasticity must be passed through. The advantage of removing the moisture in the preliminary treatment will be more pronounced in high-temperature practice than in low-temperature work.

It appears that Wisner has applied his system in this direction. The crushed coal was first heated for about 30 or 40 minutes at a temperature of about 300° C. The thermodized, or oxidized, coal was then said to be in a state of advancement equal to the average coke-oven charge (18-hour coking) after 8 hours' heating. This fuel was then charged direct into a coke oven and coked for 12 hours, resulting in the production of a high-grade metallurgical coke claimed to be equal to that produced by 18 hours' coking in the ordinary manner. On this basis it will be seen that a saving of nearly one-third of the total coking time would be effected, which would result in appreciable labour saving, and a reduction in capital charges.

BLENDING WITH PREHEATED COALS.

It has been shown that coke breeze may be mixed with coal to advantage, whether for high or for low temperature work. What is true of ordinary coke breeze is true also in the case of semi-coke fines and of preheated coals. The advantages of blending semi-coke fines has been demonstrated at Karnap, Germany, in connection with the K.S.G. retort, where part of the fines produced in this low-temperature retort were passed to the coke oven plant for blending with coal. This scheme was found to obviate the necessity for compressing, or stamping, the charges for the coke oven plant. Formerly stamping was practised at these ovens. In Silesia also it has been found that by blending semi-coke dust with Silesian coals a much superior coke was produced, which considerably increased the output of the blast furnace and gave an improved quality of pig iron.

ARTIFICIAL NON-COKING COALS.

Mention has already been made of the use of non-coking coals as the inert medium for blending. It was foreseen that cases would arise where the absence of such coals would necessitate the treatment of coal to provide such inert material. It was known that the coking properties of coals could be destroyed by prolonged oxidation. Therefore, provision was made by the writer in 1921 (B.P. 187,336) for preparing artificial non-coking coals as an alternative for blending purposes. In cases of this sort it is as well if the inert fuel will just fuse at high temperature under rapid-heating conditions. Hence, it is advisable to reduce the binder only to the degree required for attaining the end in view. The process outlined in the specification referred to consists in substituting for a natural non-

coking coal a coal which has been oxidized at a temperature ranging between 100° and 300° C. to such an extent that it would be practically non-coking. This fuel is then mixed in suitable proportions with a coking coal. The proportions of the respective ingredients in the blend would, of course, vary with the class of coal available, the purpose for which the smokeless fuel was to be used, the character of the plant, and the heating conditions of carbonization.

INFLUENCE OF INERT ON STRUCTURE OF COKE.

The nature of the inert material exercises an influence on the properties of the fuel made from the blend. Coke dust, even when finely ground, is porous. Therefore it allows the binder to permeate the pores and to cement the blend thoroughly. Care must be taken, however, to see that too much coke dust is not used; otherwise a friable fuel will result. Non-coking coal of high volatile content is also more or less porous; at any rate, it is not so dense as anthracite. Hence, firm resistant cokes can be made with the high-volatile coals. Where the fragments are coarse, a coarse-grained fuel is produced, having a rough granular fracture. This property has proved an advantage from the combustibility standpoint, as will be referred to in a later article. In the case of anthracite the coal is so dense that the coking ingredient in the blend merely attaches itself to the particles. Therefore, the resulting coke will not be so tough as that made from a coal/coke blend. The property of toughness, however, is not always an essential one, so that anthracite duff may be successfully used as the inert material.

Recapitulating, we have described how the chief difficulties encountered in low-temperature processes may be overcome. The two main systems are blending and pre-heating. The inert material used in blending may consist of: (*a*) Coke dust, (*b*) high-volatile non-coking coal, (*c*) anthracite or low-volatile coking coals, or (*d*) oxidized or pre-heated coals. The pre-heating systems embrace: (*a*) Heating in the presence of air at temperatures ranging from 100° to 300° C.; (*b*) heating the coal in the absence of air at temperatures ranging between 100° and 300° C.; (*c*) partially distilling the coal in the absence of air at temperatures in the region of 400° C. Examples have been given of the application of these processes.

ROAD TAR AND ITS USES IN GREAT BRITAIN.

By W. E. CONE, of the British Road Tar Association.

[From a Paper before the French Tar Producers and Distillers' Association, in Paris, on July 2.]

Coal tar—the earliest of all modern road surfacing materials—has made possible in Great Britain the construction of highways which are looked upon as a model by the whole civilized world. It is interesting to speculate what might have been the advances made in regard to roads during the last half-century had it not been for tar. The advent of mechanical transport brought in its train the dust nuisance, and speedily showed up all the defects of the roads, and particularly the unsuitability of their surfaces. Through the efforts of unofficial enterprise, experiments were undertaken with tar to overcome the evils referred to, and, in the next few years, the success of this innovation was of such a nature that the roads had reached a higher state of perfection than at any time since the days of the Romans. This position has been maintained up to the present time; and we find in Great Britain not only that tar is the premier material for the construction of roads, but that its use is annually increasing.

The production of coal tar in Great Britain is about 2 million tons, and is derived from the gas and coking industries in the approximate proportion of 1,350,000 to 650,000 tons respectively. As an indication of the extent to which the preparation of road tars is increasing, it is estimated that the output in 1923 was 450,000 tons, and in 1927 700,000 tons—an increase in five years of 55 p.ct. It is also interesting to compare the importation of asphalt and bitumen into Great Britain over the same period, the quantities being 262,871 and 260,640 tons respectively. While it is not desirable to make invidious comparisons, or in any way minimize the inroads that asphalt and bitumen have made in the national schemes of highway construction, the foregoing figures, in their proper perspective, are a direct refutation of the misinformed statements which are made from time to time as to the diminishing use of tar in Great Britain for road-making purposes. Additional evidence is also forthcoming from the Preliminary Reports of the Third Census of Production, 1924. Under the heading "Tar Paving and Other Paving and Road Materials," the following extracts are taken from the table which gives details of the output in 1924 of firms in Great Britain engaged mainly, or solely, in the preparation of tar paving and other road materials.

Products, 1924.	Selling Value.
	£
Asphalt and bitumen	670,000
Tarmacadam (slag, stones, &c.)	2,208,000

The amounts shown above do not completely cover the production in Great Britain of the various classes of paving materials specified, since they are exclusive of such materials as are manufactured by building and road contractors and public authorities for their own use in road-making work, and also exclude the paving materials used by the manufacturing firms in carrying out road-making contracts. There are no means of estimating for 1924, or the successive years, the respective values of the total production of these products for all purposes, but it is of interest to compare the values given as being some indication of the extent to which tar is used.

The mileage of roads in Great Britain is 178,737. There are 25,112 miles of Class I. roads, 15,683 miles of Class II. roads, and 40,933 miles of scheduled unclassified roads. Taking the latest figures available, the expenditure by local authorities upon the maintenance, improvement, cleansing, and construction of highways, bridges and ferries in Great Britain, excluding loan charges, has been as follows.

—	England and Wales.	Scotland.
	£	£
1921–22	44,826,100	4,562,250
1922–23	45,475,600	4,802,500
1923–24	45,263,100	5,433,000
1924–25	50,673,300	5,871,750

The estimated total expenditure upon ordinary maintenance and repairs of Class I. and Class II. roads and bridges in Great Britain is, according to the Ministry of Transport analysis of the Local Authorities' Returns for all roads, as follows:

	£		£
1921–22	16,351,000	1924–25	20,047,000
1922–23	19,108,000	1925–26	20,119,000
1923–24	18,678,000	1926–27	20,254,000

In spite of the great sums that have been spent on roads, additional expenditure will have to be incurred to keep pace with the demand for better roads. As road traffic is still increasing in volume and weight, failure of the improvement and reconstruction programme would be a serious factor in the commercial and industrial prosperity of the country every year. It is safe to deduce that the tonnage of traffic on the roads has more than doubled itself during the past five years. If the same rate of progress is maintained during the next few years, it will necessitate increased grants to the local authorities, so that the reconstruction and improvement of the roads will make them equal to the increased traffic they will have to carry.

The general trend of policy on the part of highway authorities in Great Britain is towards the adaptation of their roads to the requirements of modern traffic by the use of tar, either as a surface dressing or as a road-surfacing material. Surface dressing with tar has now come to be regarded as an essential procedure in the efficient and economical maintenance of all water-bound roads carrying motor traffic, with the object of providing a waterproof crust and thereby preventing disintegration of the surfaces by traffic in wet weather. Tarmacadam is no less popular as a surfacing material for the construction of new roads; and the hundreds of miles of tarmacadam roads throughout the length and breadth of Great Britain testify to the success that has attended this material since its inception. That this position is being maintained can be seen from the following extracts taken from the Report on the Administration of the Road Fund for the year 1926-27, and other sources:

County.	Increased Mileage of Tar Macadam.	
Perthshire	15	Trunk road reconstruction.
Inverness-shire	61	
Warwickshire	10	
Staffordshire	18	
Merionethshire	6	

Waterbound Roads Resurfaced with Tarmacadam.

County.	Increased Mileage of Tar Macadam.
Cheshire	47
Leicestershire	24
Derbyshire	12*
Nottinghamshire	6*
Shropshire	10*
Warwickshire	12*
Worcestershire	11

* Estimated.

Surface Tarring of Existing Roads.

Location.	Quantity of Tar Used.
Hampshire	1926—approx. 2,250 tons
	1927 ,, 3,500 ,,
South Coast of England	1926 ,, 24,800 ,,
	1927 ,, 29,000 ,,

These figures represent only a small proportion of the developments that are taking place in Great Britain with regard to the tar treatment of roads, but they are indicative of the growing appreciation and confidence reposed in tar.

As was to be supposed with the huge sums of money annually expended on the roads, competitors have sprung up; and the road business, if I may term it such, is rapidly becoming a highly competitive industry. It was only natural, therefore, to expect that derogatory statements would be made against tar, if only to make the competitive materials appear in a better light.

It is well, therefore, to summarize the advantages of tar as a road-making material:

(1) Low initial cost.
(2) Minimum maintenance charges.
(3) Ease of application.
(4) Durability.
(5) Resiliency.
(6) Permanent non-skid surface.
(7) Dustless and waterproof.

The selection of a surfacing material for any road project is nearly always determined by the funds available. It is not enough that road authorities should only know the cost of construction; it has become imperative that they should be familiar with the cost of maintenance. In this respect the advantages of the more extended use of tar are well worth consideration. Not only does this material respond to the demand for economy, but it provides, in its variety of uses, durable and safe roads over long periods of years. It would be difficult to determine the useful life of a well-constructed tarred road laid on a sound foundation. Such roads, however, are in existence in Great Britain to-day which were laid fifteen to twenty years ago, and have received no further treatment, other than annual or bi-annual tar-spraying. The adaptability of tar for road uses is a predominant factor in its ease of application. This is reflected in low labour costs; the work being sufficiently simple to need only unskilled labour under suitable supervision. An additional advantage is the resiliency of the tarred road. The impact shocks imparted by heavy mechanical traffic are absorbed in the tarred road, which materially lengthens its life. The tarred road presents a compact waterproof and dust-free surface which is completely proof against skids, in all weather, for the whole life of the road. Throughout Great Britain tarred surfaces are becoming more and more recognized as by far the safest for all classes of traffic, and miles of roads constructed of other bituminous substances have been treated with tar to make them safe and tenable.

A limited number of practical experiments in road work have been undertaken by the British Road Tar Association, of which the following is not without interest. To determine the traffic-bearing capacity of a well-constructed tarmacadam road, an experimental stretch of tarmacadam was laid on a main road leading out of London. The materials used in the construction were cold-blast slag and a specially refined tar. The manufacture and laying of the tarmacadam were carried out in accordance with the author's specification, and under his personal supervision. Graded slag from 1¼ in. down to 200 mesh, intimately mixed with the special tar, formed the surface coat, which was laid on a base coat of mixed grade slag and tar to a consolidated depth of 6 in., in layers of 4 in. and 2 in. respectively. The foundation consisted of 7 in. of concrete, and each coat was laid separately in the heated state and compacted by rolling. Within a few hours of completion the stretch was opened to traffic, and for a period of eight months it has been subjected to a daily traffic of 25,000 tons. The Engineer and Surveyor has expressed his satisfaction with the test, which it is hoped will contribute to the adoption of improved methods for the manufacture and laying of tarmacadam. The importance of this test cannot be overrated, for it supplements the preceding remarks on tarmacadam, and shows that under correct manufacturing and laying conditions this material is capable of withstanding the heaviest traffic conditions. It is hoped in the near future to extend this branch of the Association's work, which is looked upon as being of the utmost importance in the furtherance and advancement of road tar in Great Britain.

The future of tar for road-making is a dual responsibility, and rests with the engineer and the chemist; its future advancement will only be brought about by their collective efforts, and it would seem unnecessary to urge both the tar producer and the distiller to see that facilities are given whereby this can be achieved. Another equally important factor is the transport and distribution of tar over the road. The transportation of large quantities of this material necessitates that advantage should be taken of improved methods. In this respect, several interesting types of vehicle are being utilized in Great Britain. These tar tankers have a capacity up to 2300 gallons and are lagged, or equipped with steam coils, to maintain the desirable temperature of the tar. They are fitted with pumps for filling and discharging. The old method of distributing tar over the road by manual labour is rapidly being supplanted by machines specially devised for the purpose. Many of these machines are designed for tar spraying and gritting to be carried out in one operation, which considerably facilitates the surface dressing of roads.

LETHAL GAS.

By "A—Z."

Yet another application of coal gas has been made which should be listed among the "Thousand-and-One Uses," as it is a further example of the flexibility of town gas.

Recently a number of my men were engaged laying a 12-in. main under the footpath of a suburban road bordered by a dense privet hedge. One of the men threw his coat over the hedge, when immediately about a dozen wasps flew out and asked him, in no uncertain language, what he meant by it. Without waiting to reply, the man went down the road at the double, the wasps in hot pursuit, one of their number getting in a well-planted sting in the back of the neck of the enemy. The coat was recovered by a *coup-de-main;* but whenever the men approached the neighbourhood of the nest (evidently concealed in the hedge), and struck the ground with pick or spade, the wasps made angry demonstrations, and thus appeared completely to dominate the position.

Headquarters were then telephoned for instructions, on which the Chief of Staff suggested that a gas attack should be organized. This was quickly done. Several lengths of malleable tube were hastily put together, and a stream of gas was turned on to the hedge. These tactics were successful. The enemy was vanquished, the position rushed, and the nest torn from the hedge, carefully pinned up in a paper bag, and carried in triumph to Headquarters, where it still remains under close observation.

The Chief of Staff was curious to ascertain whether the gas had penetrated the walls of the cells still occupied by immature grubs. As is well known, these walls are not quite impervious to air; but evidently the gas had not entered in sufficient quantity to damage the occupants of the cells. Next day four wasps came forth, inert and greatly astonished at the strange world in which they found themselves. These quickly died from sheer inanition. At the end of a week there are still signs of life in some of the cells; one of the grubs vainly endeavouring to make its way out.

It may interest your readers to know that this town was perhaps the first to adopt town gas as a lethal weapon in connection with the local dogs' and cats' home. As is well known, large numbers of dogs and cats have to be destroyed weekly in such institutions. If not claimed or sold, or if diseased, they must be put away as quietly and painlessly as possible. Shooting is out of the question on account of the alarming noise; poisoning is much too painful. The local institution was in the habit of using a charcoal stove, but found the application of carbon monoxide too slow in its effects, and too costly. The writer was appealed to regarding the possible use of town gas, and expressed the opinion that its application would be sure, painless, and inexpensive.

The first victims experimented on were a handsome collie and a rough-haired terrier. The former had developed a vicious nature, and had been sent by its owner to the home for the special purpose of being destroyed; the latter was one of the unfortunate "not-wanteds." These two dogs were put into the lethal chamber (a brick hut measuring 6 ft. by 4 ft. by 3 ft., with an observation window in the door), and the gas was turned on. The two victims were very friendly with one another, gambolling about in a lively manner for some ten minutes. Then the terrier suddenly fell on his chest, recovered, fell again, rolled over, and passed away quietly without a single struggle.

The collie walked about the floor of the hut, quite unconcerned, for a minute longer, then suddenly fell on his side, breathed stertorously for some ten seconds, stretched out his legs, and died.

It was interesting to note that from first to last neither victim showed the slightest signs of distress, uttering not a single bark, yap, or howl. These two animals were put away at the cost of threepennyworth of gas; and the authorities were satisfied that the use of town gas for lethal purposes was painless, effective, and economical.

WESTERN JUNIOR GAS ASSOCIATION.

Visit to the Works of George Waller & Son, Ltd., Stroud.

THE WESTERN JUNIORS AT MESSRS. GEORGE WALLER'S WORKS.

The members of this Association, numbering more than forty, arrived at the Phœnix Iron Works of Messrs. George Waller & Son, Ltd., at 11 a.m. on June 29, and were received by the Directors. Inspection was then commenced of the foundry (where iron and brass casting was in operation), the pattern shop, the fettling shop, and the casting stores and finished parts stores. The machine shop, where a large amount of exhausting and boosting plant was in the process of manufacture, was visited, as also were the fitting shops and test benches, where an exhauster set for 220,000 c.ft. per hour with compound engine was being tested. Interest was evinced in the large amount of export work in hand, including big exhausters for Japan, Canada, and Australia. Various turbo boosting sets were in course of construction, and a set of vertical high-speed enclosed type gas compressors were being erected. Probably chief interest was taken in a "Crankless" booster with combined gas engine for dealing with 100,000 c.ft. per hour at 7 lbs. pressure. The internal construction and details of this plant were explained. Two "Retriever" pan ash separating plants—one for dealing with 4 tons per hour and the other for 1 ton per hour—were in operation, dealing with a load of ash material which had been furnished by Mr. W. S. Morland, of Gloucester.

Power for the works is electrical, produced by gas-engine driven generating sets with suction plants using small anthracitic coal. Most of the larger machines are driven by individual motors. After inspecting the plant house the members left for Stroud, where they were entertained at lunch in the Premier Hall.

After the Loyal Toast had been honoured,

Mr. ARTHUR MARSDEN (the President) proposed the toast of "Messrs. George Waller & Son, Ltd.," and coupled with it the names of Mr. B. B. Waller and Mr. E. F. Hooper. He was sure the members had been very interested in all they had seen on the works; and he gratefully acknowledged the hospitality received, and expressed best wishes for the future of the firm.

Mr. B. B. WALLER, replying, said that it was a privilege and a great pleasure to receive the members of the Western Junior Gas Association. Referring to the "crankless" booster and engine, he observed that this was the work of Mr. Michell, an Australian inventor, who was responsible for the well-known propeller shaft thrust bearing; and he (the speaker) felt sure that this particular design had a great future. He referred also to the large amount of overseas trade they enjoyed, and the wonderful development of the gas industry in the great countries of the Empire. He congratulated the Western Junior Gas Association on their activities.

Mr. E. F. HOOPER also briefly responded.

Subsequently the party left Stroud for a motor trip through the Cotswold country.

FORTHCOMING ENGAGEMENTS.

[Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.]

Aug. 14-15.—IRISH ASSOCIATION OF GAS MANAGERS.—Annual conference in Belfast.

Sept. 5-7.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Annual general meeting in Edinburgh.

Oct. 22-24.—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual Conference at York.

THE INSTITUTION OF GAS ENGINEERS.

Sept. 10.—Emergency and Finance Committees and Benevolent Fund Committee of Management in the morning; Council meeting in the afternoon.

Oct. 8.—Emergency and Finance Committees in the morning; Council meeting in the afternoon.

Oct. 9.—Gas Education Committee.

Nov. 12.—Emergency and Finance Committees in the morning; Council meeting in the afternoon.

Nov. 13.—Executive Committee of Gas Education Committee.

Dec. 10.—Emergency and Finance Committees in the morning; Council meeting in the afternoon.

Dec. 11.—Executive Committee of Gas Education Committee.

All meetings take place in the Council Room at 28, Grosvenor Gardens, unless otherwise stated.

British Waterworks.—The second edition of the "British Waterworks Year Book," just published by the British Waterworks Association, contains much information relating to waterworks undertakings in Great Britain and Ireland, and some of the British waterworks overseas. The book is in three parts: (I.) Directory, (II.) Statistical Tables, and (III.) General Information. The Directory part gives in alphabetical order the names of undertakings, with particulars as to date of establishment, names of chief officials, special Acts and limits of supply, the sources of supply, and the character of the water. Domestic charges, charges for metered and other supplies, and miscellaneous charges, including bulk supplies, and public water rate, if any, are also given. There are two financial tables, A and B, giving an analysis of the accounts of municipal undertakings and company undertakings respectively. The main headings show the rental from domestic and unmeasured supplies, measured supplies, and bulk supplies with meter rents, &c., and public water rate or deficiency rate, if any; rates and taxes and other working expenses; loan charges; the total expenditure and balances; with the capital expenditure during the year, total capital expenditure, and the net debt at the end of the year.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Field's Analysis, and Prices per 1000 C.Ft.

SIR,—I agree with Mr. Pooley that it is desirable to retain the figures giving the costs per 1000 c.ft., but I suggest, so that the volume figures may not be misleading, that they should be calculated upon the declared calorific value of the gas, and reduced to a uniform basis of 500 B.Th.U. gas.

If costs per 1000 c.ft. are given without taking into account the calorific value of the gas supplied, they are utterly fallacious, and useless for the purpose of comparison.

J. FERGUSON BELL.

Derby Gas Light and Coke Company,
Friar Gate, Derby,
July 12, 1928.

SIR,—In communications to your pages, I have more than once shown that the manufacturing, purifying, storing, distributing, measuring, and internal fittings costs are influenced by the bulk more than by the quality—in other words, by the c.ft. more than by the therm. So long as these conditions are in existence, the works engineer or accountant will desire that the practice of stating results in terms of "1000 c.ft." shall be retained; and the same applies to the secretarial department. But they are also interested in the cost per therm.

For technical and professional use, both the cost per c.ft. and the cost per therm are required. But from a buyer's or a valuer's point of view the c.ft. may be superfluous, if not misleading. Where the selling unit is the therm, all figures relating to price, appropriation of profit, or valuation can be more conveniently dealt with in terms of therms.

The obvious conclusion is that both are required for technical or professional purposes, but are not desirable outside that circle, being likely to cause confusion and misunderstanding. Some years ago I was told that in Cambridge the custom was to sell butter wholesale by the "yard."—*i.e.*, by bulk. Special information is required—as explanation of the connection between the yard and the pound. The customer who buys by weight would prefer all information relating thereto to be in terms of the buying unit; and the same applies to the buyer of gas. In fact, he might go further—take gas out of the question, and figure on heat quantities alone, apart from the medium by which they are generated.

N. H. HUMPHRYS.

5, Wyndham Road, Salisbury,
July 12, 1928.

SIR,—Now that gas is sold on a thermal basis, there can be no doubt that comparative results of different gas undertakings based on the number of cubic feet sold are misleading, if not useless. No valid comparison on a basis of volume could be made between (say) the South Metropolitan Gas Company, which supplies gas of 560 B.Th.U. per c.ft., and an undertaking of similar size supplying gas of (say) 450 B.Th.U. per c.ft. Such a comparison would be to the detriment of the former.

The change in the method of charging in our industry was instigated by the Board of Trade and the National Gas Council, but for some occult reason we are still asked to contribute to the Gas Fund of the Board, and to the National Gas Council and associated bodies, on a basis of output in millions of cubic feet. Perhaps Mr. Ibbs is waiting for a lead from those who sit in high places before finally discarding the "costs per 1000 c.ft." from his "Analysis."

F. A. GUILLAND,
Secretary and Accountant.

Gas Company,
Maidstone,
July 10, 1928.

REGISTER OF PATENTS.

Direct-Reading Meter Indices.—No. 292,008.

PERFECTA METERS, LTD., and SMALL, F. G., both of Hither Green, S.E. 13.

No. 29,177; Nov. 1, 1927.

This invention relates to direct-reading, counting, and registering devices, and has for its object to eliminate errors due to approximate readings, especially in gas meters where hitherto the volume of gas consumed has been indicated in units intermittently.

The index mechanism is described and illustrated in detail in the specification; and extracts from the claims are as follows:

1. Counting and registering mechanism comprising in combination a plurality of toothed indicating wheels intermittently rotatable on a common shaft, gearing interconnecting adjacent wheels in decimal ratios, a driving wheel on the common shaft geared to the tens-of-units indicating wheel in decimal ratio, a shaft disposed perpendicularly to the axis of the indicating and driving wheels, gearing for imparting motion to said perpendicular shaft from an external source, bevel gearing for transmitting motion from said perpendicular shaft to said driving wheel, and an index on said perpendicular shaft moving over a dial calibrate in units and sub-multiples of a unit.

2. The arrangement of the index and dial for indicating units and sub-multiples of a unit in a plane or planes coincident with, or substantially parallel to, the plane of the exposed figures on the peripheries of the wheels serving to indicate multiples of units.

3. A counting and registering device, as claimed, adapted for use in connection with gas meters, wherein the volume of gas passed through the meter is indicated in terms of calorific value—that is to say, in therms.

Flue Blocks.—No. 292,308.

RADIATION LTD., of Birmingham, and ALLEN, S. R., of Luton.

No. 11,260; April 27, 1927.

Sometimes flue blocks are constructed to provide a pair of independent flues. With such blocks, say the patentees, difficulty has hitherto been encountered owing to the tendency under certain atmospheric conditions for the gas passing out of the building through the upper end of one flue to re-enter the building through the outer end of the adjacent flue. The object of the present invention is to obviate this difficulty in a simple and effective manner.

The invention comprises the formation in the block which serves as the exit at the upper end of the flue of a pair of passages which at the underside are in the form of long and narrow apertures lying parallel with each other along the length of the block, and which at the upper side are in the form of substantially square or wide apertures situated side by side; the intermediate portion of each passage being suitably shaped to pass gradually from the one form to the other. There is also provided at the upper side of the block a central ridge which co-operates with a suitably shaped cap; the ridge serving to divide the air channel within the cap into two parts for the purpose of isolating the flue passages.

Partial or Complete Gasification.—No. 292,408.

MOORE, H. S., of Burnham-on-Sea, and MOORE, W. S., of Frizington.

No. 30,104; Nov. 10, 1927.

This invention relates to improvements in apparatus for partial or complete gasification of coal. The plant consists of a retort superimposed on a water gas generator; and the important feature of the invention is a series of annular superimposed chequered recuperative heating chambers surrounding the retort. By means of a number of horizontal refractory tiles in conjunction with one or more vertical refractory division walls, the annular space around the retort is divided into several superimposed twin recuperative chambers, each packed with chequer firebricks, and each tier inter-communicating with another tier either above or below, or both above and below. This particular design, state the patentees, has many advantages:

(*a*) Uneven heating of the retort is impossible.

(*b*) The chequer bricks are not liable to get displaced.

(*c*) The construction helps to support much of the deadweight that would otherwise depend upon the retort for support.

(*d*) The chambers can be utilized for carburetting gas oil if it is desired to enrich the gas.

(*e*) Because of the unusually long travel of the "blow" gases through these chambers (in direct contact with the wall of the retort) more heat is absorbed by the chequer-work.

There are various methods of operating this plant, depending on whether it is desired to produce coal gas, blue water gas, carburetted water gas, mixed coal gas and water gas, or low-grade (industrial) gas.

The method of working is also influenced by whether it is desired to produce coke and tar; or totally to gasify these products.

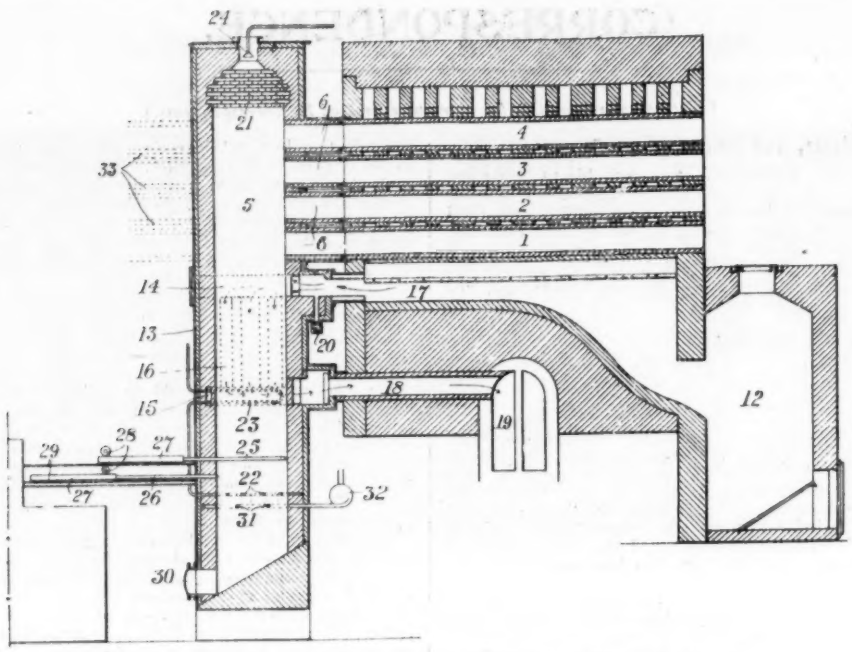
Coal Gas Manufacture.—No. 292,235.

CANNING, T. F., and CLARK, R. G., both of Southend-on-Sea.

No. 7216; March 15, 1927.

This invention relates to plant for the manufacture of coal gas and water gas, wherein horizontal or inclined retorts are adapted to be discharged into vertical chambers; such plants being provided with one or more heating means, each being variably and independently controlled, and steam and (if desired) oil being introduced into the gas at any convenient points. The new plant differs from what has been previously proposed in that it is so constructed and arranged that producer gas from a common source is led to both the exterior of the retorts and the exterior of the chamber and independently controlled to both. The hot gases from the chamber are conducted into the retorts through their discharging outlets.

The coke, or coke with a core of partly-carbonized coal, after discharge from the horizontal retorts into the chamber, is subjected to steam which gradually cools the coke and, forming water gas, completes, or substantially completes, the driving off of volatile matter



WATER GAS *CUM* HORIZONTAL RETORTING.—CANNING AND CLARK.

remaining in the coke. This action is assisted by heating the walls of the chamber.

In the drawing which we reproduce, 1, 2, 3, and 4 are retorts, discharging into their chamber 5 through extensions 6. The retorts and chamber are heated from the same producer 12, but with independent variations of temperature. The chamber 5 is formed by a steel envelope 13 lined with firebrick having horizontal heating passages 14 and 15 in communication by vertical heating passages 16. Producer gas from 12 enters passage 14 from flue 17 and takes the course shown by the arrows, leaving by way of a damper-controlled waste flue 18 and a main flue 19. A secondary air inlet for the chamber heating gas is provided at 20, and is adjustable. The upper part of the chamber 5 is provided with checker brickwork 21, which becomes heated during the working of the plant and assists in vaporizing any oil to carburet the water gas produced in the chamber. The steam for this purpose is introduced by jets 22 after passing through a superheater 23 which is subjected to the burning gas in the passage 15. A spray serving for the introduction of the oil is shown at 24.

In practice the producer gas from 12 travels along 17 and, mixing with secondary air in the usual way, passes up around the retorts as usual, and thence goes as usual by waste gas flues and flue 18 to main flue 19. Part of the gases from 12 to 17 is admitted by passage 14 around the chamber 5 and travels by passages 16 and out by passage 15. The latter has a damper by which the heat around the chamber can be controlled, while the heat to the retorts is independently controlled in convenient manner.

A form of coke extraction gear is also described and claimed.

The actual process according to the invention is substantially as follows:

Coal is charged into the retorts where the usual main carbonization takes place, after which the charge is pushed by any convenient method into the chamber 5; the retorts being recharged. Superheated steam is admitted from the supply jets 22 and passes up through the extraction gear and the coke in the chamber. The steam helps to keep the extraction gear cool, and in passing through the hot coke is converted into water gas. The heat produced by the gas burning in the passages 14 to 16 in the walls of the chamber assists the sensible heat of the water gas to carbonize the residue completely. The water gas passes from the chamber through the retorts and assists in the carbonization of the charge and at the same time, by sweeping them rapidly out of the retort, protects the hydrocarbon gases distilled from the coal from being broken down or degraded. The passing of the water gas through the horizontal retorts increases the rate of carbonizntion of the coal; and the coke leaving the bottom of the steel chamber is "cold" when withdrawn. By the process it is claimed that the fuel required to heat the retorts is reduced and the gas made per ton of coal carbonized is increased, while the calorific value of same is maintained.

During the combined process, oil or other suitable enriching material may be introduced by the spray 24. The chamber is shown with nozzles 31, which may be used for injecting oxygen, air, or inert gas or gases into the chamber under the action of a pump or blower 32. Dotted lines 33 indicate a manner in which additional retorts could be incorporated.

Complete Gasification.—No. 292,410.

REGENERATIVE COAL GASIFICATION SYSTEM, LTD., of 147, Queen Victoria Street, E.C. 4, and TRAVERS, M. W., of Clifton.

No. 30,353; Nov. 11, 1927.

This invention is a modification of Patent No. 210,356, in which a quantity of the gas obtained by the complete gasification of bituminous fuel, and cooled to the air temperature, is reheated in a regenerator, whence part of the reheated gas passes into the carbonization section of the generator in order to carbonize the fuel in it, and a part passes into a carburetter into which oil is sprayed for the purpose of enriching the gas. The carburetted gas does not return to the regenerator or to the generator. The regenerator and carburetter are both heated by the gas generated in the air blow process, and the waste gases from this process pass out through stack valves in the top of the regenerator and carburettor respectively.

According to this invention, in order to secure more effective heating of the outlet end of the carburettor, the blow gas, instead of passing in parallel through the regenerating and carburetting chambers, passes through these chambers serially, first through the regenerator and then through the carburettor. The specification includes diagrams showing three different ways of effecting this.

Gas Fires.—No. 292,442.

CARMUIRS IRON COMPANY, LTD., and WILKIE, J., both of Falkirk.

No. 6018; Feb. 27, 1928.

According to this invention, the burner chamber of a gas fire comprises an elongated oblong box closed at the top except for the provision of burner nozzles at the front part of the top of the box, and having a removable bottom plate which is provided with a rear central inlet aperture for the air and gas mixture, which enters the box through a pipe or elbow secured to the underside of the bottom plate. The top, front, back, and ends of the box are preferably formed as a single casting, and the burner nozzles are also preferably cast integral with the top of the box. The underside of the top of the box is provided with an annular or countersunk recess around each burner orifice, below each of which is supported an atomizer, preferably consisting of a foraminated disc of refractory material. The atomizers are carried by a bearer or cross-bar having a sufficiently large opening beneath each disc to permit the passage of the gas mixture to the burner. The bearer is loosely fitted into the box, and is held in place by supports resting upon the bottom plate of the box.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for July 11.]

Nos. 19,067—19,827.

BASTIAN-MORLEY COMPANY.—"Gas burner." No. 19,699.
GLOVER, W. T.—"Indicators for gas meters." No. 19,706.
HUMPHREYS & GLASGOW, LTD.—"Mechanism for transmitting motion." No. 19,377.
HURLEY, T. F.—"Retorts, kilns, &c." No. 19,709.
KARRICK, L. C.—"Production of gas." No. 19,793.
KARRICK, L. C.—"Distilling carbonaceous material." No, 19,794.
LANDER, C. H.—See Hurley, T. F. No. 19,709.
MATTHEWS, F. G. & R. C.—"Gasholder syphon." No. 19,750.
METERS, LTD.—See Glover, W. T. No. 19,706.
MILES, J.—"Gas burners." No. 19,127.
PIGGOTT & Co., LTD., T.—"Tanks for liquid storage." No. 19,342.
SHEWRING, H.—See Glover, W. T. No. 19,706.

Crowland Gas Company.—The shareholders of the Crowland (Lincolnshire) Gas Company have decided to wind up the Company, and liquidators have been appointed to carry this resolution into effect.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

South Suburban Gas Bill: Read the third time; amendments made. Bill passed, and returned to the Commons.

London County Council (General Powers) Bill: Returned from the Commons, with the amendments, agreed to.

Wrexham Gas Order: Referred to the Special Orders Committee.

Road Protection Bill.

On July 11, Lord Montagu of Beaulieu presented a Bill to restrict the breaking up of roads for the purpose of laying down and repairing pipes, wires, and apparatus. The Bill was read the first time, and ordered to be printed.

HOUSE OF COMMONS.

Progress of Bills.

London County Council (General Powers) Bill: Lords amendments considered, and agreed to.

Tottenham and District Gas Bill: As amended, considered; to be read the third time.

South Suburban Gas Bill: Lords amendments considered, and agreed to.

Bournemouth Gas and Water Bill: Read the third time, and passed.

Dover Gas Bill: Reported with amendments.

Wrexham Gas Order: Copy presented.

Mining Subsidence at Abertillery—No Compensation.

Mr. Barker, on July 12, asked the Secretary for Mines if he was aware that the gasholder at the Abertillery Gas-Works had been seriously damaged by mining subsidence and had to be reconstructed before it could be used, and would he expedite the report of the Commission dealing with the question, in view of the damage done to public and private property by unscientific mining operations.

Capt. H. D. Margesson, who replied, said that the report of the Royal Commission on Mining Subsidence was presented to Parliament last year, and specifically stated that no case had been made out for the grant of a special right to compensation for damage caused by mining subsidence in the case of property owned by local authorities or by statutory gas companies.

DOVER GAS COMPANY'S BILL.

This Bill, the principal purposes of which are to authorize the conversion and consolidation of capital, and the application of the basic price and basic dividend system, with its corollary co-partnership (see "JOURNAL" for Jan. 11, p. 91), was before the Unopposed Bills Committee of the House of Commons (presided over by Mr. J. FITZALAN HOPE, Chairman of Ways and Means) on Thursday, July 12. Recently a Joint Committee of both Houses of Parliament was appointed to consider the application of the basic system to the South Suburban Company and to the Dover Company (see "JOURNAL" for May 23, p. 541, and May 30, p. 604), following representations made to Parliament by the Board of Trade. This Committee having decided in favour of the application of the basic principle to the South Suburban Company, there was no opposition to its application to the Dover Company, whose Bill has since passed through the House of Lords.

Mr. E. C. COOPER (Messrs. R. W. Cooper & Sons, Parliamentary Agents), when the Bill came before the Unopposed Bills Committee of the House of Commons, observed that at present the Company was a maximum price and maximum dividend concern. With regard to the basic price and dividend principle, he said there were a number of precedents for its application, but the Board of Trade had not held the same view as to the expediency of the principle as had been held by the various Parliamentary Committees which had dealt with the matter; and the Joint Committee had been set up to consider the observations addressed by the Board or Trade to Parliament in connection with the South Suburban and the Dover Companies' Bills. Subsequently the Dover Company's Bill had been dealt with by the Unopposed Committee of the House of Lords. The South Suburban Company's Bill had escaped that ordeal, however, and had now emerged from both Houses successfully.

Questions were asked by the CHAIRMAN as to why the Dover Company's Bill was now before the Committee, and he inquired whether it had been opposed other than by the Board of Trade.

Mr. COOPER replied that there had been one petition against the Bill in the early stages, but the matter had been adjusted long before the Bill reached the Joint Committee.

Sir ERNEST MOON, K.C. (Speaker's Counsel), said the Joint Committee had not reported that they had passed the preamble of the Bill, and that was why it was before the Unopposed Committee.

The CHAIRMAN asked what the Joint Committee had reported.

Mr. COOPER said they had decided to uphold the basic principle in the South Suburban Company's Bill, and had applied that ruling to the Dover Company's Bill, which latter was reported to the House without amendment.

The CHAIRMAN asked why the Unopposed Committee was concerned with the Bill, and whether it was merely by accident that it was there at all.

Mr. COOPER said he assumed it was for the Committee to consider the amendments made in the House of Lords. After the Joint Committee had reported, the Bill was recommitted in the House of Lords, and amendments were made (see "JOURNAL" for June 27, p. 1024).

The CHAIRMAN: Though the Joint Committee had not recommended any?

Mr. COOPER agreed.

Replying to further questions, Mr. Cooper said the Bill now embodied amendments inserted in the House of Lords at the instance of the Board of Trade. An arrangement was come to, which was approved by the Parliamentary Committee of the Dover Corporation, and ratified subsequently by the whole Council.

Dealing with the provisions of the Bill, he said it was not proposed to raise any additional capital; it was purely a matter of conversion from a denomination of £10 to £1, the desire being to "democratize" the Company. There was provision for establishing a co-partnership scheme in conjunction with the basic price and dividend provisions, and a clause was also inserted enabling the Company to invest in other companies after satisfying the Board of Trade that such investment was in the interests of the development of the undertaking. With regard to loan capital, power was sought in the Bill to increase it to half the amount of the issued share capital, which power was usually conceded.

Asked if the Company were going to adopt the thermal basis of charge, Mr. Cooper said they had done so some years ago.

The CHAIRMAN asked if the co-partnership scheme to be established was based on that of the South Metropolitan Gas Company and others.

Mr. COOPER replied that it was in principle. The effect of it was to give the co-partners a statutory right to their share of the profits; it was a three-part partnership.

The preamble of the Bill was proved by Mr. George Anderson, Engineer to the Company, and the Bill was ordered to be reported for third reading.

MISCELLANEOUS NEWS.

A SUCCESSFUL YEAR AT SMETHWICK.

In moving the adoption of the annual report and statement of accounts of the Gas Department at a recent meeting of the Smethwick Town Council, Alderman WILLIETS, the Chairman of the Gas Committee, said that it would be noted from the report of their Engineer and Manager (Mr. Ernest Hardiker) that the amount of gas sold showed an increase of 29 million c.ft. on the figures for the previous year. The net profit for the year was £22,317.

In his report, Mr. Hardiker says that the gas consumption for the year—872 million c.ft.—constitutes a record, representing an increase of 3·45 p.ct. over the previous year. During the past ten years, in spite of keen competition, the quantity of gas sold has increased by 37·97 p.ct. The reconstructed plant, he observes, has proved eminently satisfactory in coping with the increased demands made upon it; and he mentions that educational facilities have been given to the employees of the distribution department by means of a series of lectures and visits to the works of manufacturers of gas appliances.

The Borough Treasurer (Mr. Sidney Taylor), in submitting the accounts in connection with the gas undertaking, makes the following comments. The net revenue from the sales of gas was £129,417—a decrease of £2541 on the previous year's figures. The average net price for all gas sold was 2s. 11·6d. per 1000 c.ft., compared with 3s. 1·6d. The number of meters fixed at March 31 last was: Ordinary, 4491; prepayment, 11,823. The number of cooking stoves fixed on simple hire at March 31 was 8912. The gross profit—£47,569—showed an increase of £26,473; and the net profit for the year (as already mentioned) was £22,317.

SOUTH SUBURBAN GAS COMPANY'S CO-PARTNERSHIP.

The Annual Co-Partnership Festival of the South Suburban Gas Company was held at the Crystal Palace on Saturday last, when co-partners and their wives to the number of upwards of sixteen hundred enjoyed the varied programme arranged for them. Dr. CHARLES CARPENTER, C.B.E., the Chairman of the Company, presided; and he was supported by the Deputy-Chairman, Mr. B. R. Green, and Messrs. Harold Gundry, Frank Bush, C. J. Carter, and A. Ross (Directors), Wilfrid Wastell, Commercial Manager and Secretary, and Mr. John Terrace, Chief Engineer.

In the afternoon an excellent variety concert was provided by the "Curiosities" Concert Party, under the direction of Mr. George Cameron. During an interval in the programme, Dr. Carpenter addressed the assembled company, and in a short speech he welcomed the co-partners, not only on his own behalf, but also in the name of the Board. He referred to the greater stability secured to the Company's co-partnership by the provisions of the Bill recently promoted in Parliament, and which was expected to receive Royal Assent in the course of a few weeks.

After high tea had been partaken of, the party dispersed through the Palace and the grounds, where on a brilliant summer evening they revelled in the many entertainments provided.

DR. CARPENTER ON WORKS COMMITTEES.

In the July issue of "Industrial Welfare," Dr. Charles Carpenter, the President of the South Metropolitan Gas Company, states that after an experience of employees' committees extending over thirty-eight years, he is a profound believer in their value and usefulness as an integral part of any industrial organization. In the South Metropolitan Gas Company there is one principal Committee, known as the Co-Partnership Committee, which consists of a number of elected representatives of the workers and an equal number of members nominated by the Board of Directors. This Committee meets monthly; and, while for the first few years of its existence it concerned itself principally with the carrying on of the co-partnership scheme, it has always been a means of ventilating grievances, and of discussing matters which affect the well-being of the employees as a whole. It has no executive power, but for many years past it has had certain administrative functions as a Committee of Management of certain funds—*e.g.*, accident, health insurance, and special claims arising from sickness, &c.

The importance and, indeed, the usefulness of such a Committee, continues Dr. Carpenter, lies primarily in its value as a consultative body. Its very existence is an opportunity for the management to discuss any complaints, listen to any suggestions, and investigate any problems of work, while at the same time it acts as an efficient channel through which to enlighten the whole body of workers upon any actions and intentions of the management. The relative importance of the subjects considered by the Committee is not so significant as the spirit in which such subjects are discussed; and this must ever be one of goodwill and complete absence of suspicion on both sides.

It has been the practice for many years past for the elected representatives of the Committee to meet a week before the meetings of the Committee, to discuss among themselves matters which they desire to bring to the notice of the Committee. At this preliminary meeting no representative of the management is present; the representatives themselves having their own elected chairman. This arrangement has been found to function extremely satisfactorily, the representatives having thus an opportunity of giving free expression to their opinions, and the Committee only having before them for discussion and decision the result of such deliberations of the representatives. It is considered important that the Committee, which, as stated, is equally representative of workers and management, should meet at regular, and not infrequent, intervals.

The Co-Partnership Committee of the South Metropolitan Company was first formed in 1890; and from that time until the present it has met regularly without intermission. With this unique experience, there is absolute conviction that such a Committee is a vital necessity to efficient and harmonious co-operation between capital, management, and labour, has an educative influence upon the great body of employees, and promotes a spirit of goodwill and a pride of achievement. The hopes entertained of it have been more than justified, and it is, in fact, a small-scale Parliament of Labour. Dr. Carpenter says he has no hesitation whatever in commending to any employer the introduction of such a committee, for by it, both he and his employees will be better equipped to understand one another's point of view, and this must redound to their mutual advantage.

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

There has, if anything, been a slightly better tone in the market during the past week. Inquiry has been better, and there has been a certain amount of forward selling, though there is still a serious shortage of current trade. Northumberland is primarily affected, and the Five Counties Scheme is creating a really serious situation. It is reported that meetings are to be held shortly by the coal owners to consider the whole position. At present this district can do nothing against the subsidized export prices of Yorkshire.

The policy of maintaining quotations is still being adhered to as far as possible, so that nominal prices are mostly unchanged, and idle time is common. Wear special gas is quoted at 15s. 3d. to 15s. 6d. f.o.b., and best qualities are 14s. 9d. Seconds ask 13s. 3d. to 13s. 6d. Coking has been in fair demand, and has been sold forward at 13s. 3d. to 13s. 6d. Durham unscreened steams are quiet. Best makes ask up to 14s. 3d., and seconds are little better than 13s. to 13s. 3d. Gas coke is still firm at about 20s. f.o.b. for early shipment.

YORKSHIRE AND LANCASHIRE.

Gas coals are being booked for forward delivery at figures in advance of those of last year.

There is no apparent improvement in the industrial section of the trade, and figures indicate an ultimate decline. Coking coals are in good demand.

Export coal is in fairly good demand under the Five Counties Scheme.

Domestic coal has been in rather slow demand during the past week. Prices for the better grades are unchanged, and the ordinary grades have maintained their values.

The following are the Humber bunker and export prices, f.o.b. usual shipping ports: South Yorkshire—Hards, Association, bunkers 17s. 3d. to 17s. 6d., export 14s. 6d.; screened gas coal, export, 14s. to 15s. 6d.; washed trebles, 14s. 6d. to 15s. 6d.; washed doubles, 14s. 3d. to 14s. 6d.; washed singles, 13s. 6d. to 14s.; washed smalls, bunkers 12s. 3d. to 12s. 6d., export 10s. to 10s. 3d.; rough slack, bunkers, 11s. 6d. to 11s. 9d.; smithy peas, export, 16s. 6d. to 18s. 6d. per ton.

West Yorkshire—Hartley's (f.o.b. Goole), 13s. 9d. to 14s.; screened gas coal, 14s.; washed trebles, 14s. 3d. to 15s. 3d.; washed doubles, 13s. 6d. to 13s. 9d.; washed singles, 13s. to 13s. 9d.; washed smalls, 10s.; unwashed trebles, 14s.; unwashed doubles, 11s. to 11s. 3d.; rough slack, 8s. 9d. to 9s. 3d.; coking smalls, 7s. 9d. to 8s. 9d. export.

Derbyshire and Nottinghamshire—Top hards, bunkers 16s. 6d. to 17s. 6d., export 14s. 3d. to 15s. 6d.; cobbles, export, 14s. to 15s.; washed trebles, 14s. 3d. to 15s.; washed doubles, 14s.; washed singles, 13s. 6d.; washed smalls, bunkers 12s. 3d. to 12s. 6d., export 10s.; unwashed doubles, export, 11s. to 12s.; rough slack, bunkers 11s. 6d. to 11s. 9d., export 9s. to 9s. 6d. per ton.

Yorkshire, Derbyshire, Nottinghamshire—Screened steam coal, 15s. to 16s. and 12s. to 13s. 3d.; gas coke, export, 20s. to 23s.; furnace coke, 18s. 6d. to 19s. 6d.; washed steam bunkers, 15s. 9d. to 16s. 3d. per ton.

MIDLANDS.

While the position of many of the collieries is very bad, there is more steadiness in the distribution branches than there was a year ago as a result of the measures taken to adjust output to the shrunken requirements of the market. Pits are faring very unequally. While in the East Midlands four days' work a week is maintained in many cases, in Staffordshire and Warwickshire, where collieries inside the Five Counties Scheme have to encounter very formidable opposition from independent competitors, employment is very irregular. A few of the unassociated collieries have used their freedom to obtain such a share of the business that they are kept going the full working week. Apart from the control, however, the conditions are unequal. It is because they are able to command the market unassisted that those collieries are outside the scheme.

Prices show practically no change. They have reached a level below which they cannot well go; and this point is being emphasized by merchants. They are warning their customers that continued abstention from buying cannot safely be persisted in having regard to the steps which are being taken to make more comprehensive the restriction of output. Householders are not very susceptible to these representations with last year's experiences fresh in memory. Stocks in intermediate hands are generally low.

While stocks remain steady, the stiffer tendency of a month or so ago has not been maintained. Quotations rule at 6s. upwards, according to grade.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *July* 16.

There has been slightly more activity in pitch during the past week, and there is a greater possibility of business being started for the coming season at something just under the prices which have recently been reported.

Creosote remains at about 8d. per gallon f.o.b.

White spirits are unchanged at the prices last mentioned.

Tar Products in the Provinces.

July 16.

Markets for tar products are generally dull, and there is very little business doing.

Pitch is very quiet indeed, and Continental consumers continue to report having received offers at low figures for delivery both to the end of the year and to the end of the next shipping season.

Creosote is steady, and there is still a fair demand for both home consumption and export.

Water-white products are firm, and manufacturers are disinclined to sell in view of the fact that a further advance in the price of petrol is looked for.

Crude carbolic is steady, although makers are resisting the last reduction in price.

Cresylic acid is firm, but there is not very much inquiry.

Naphthalene is steady, with a fair amount of inquiry; but orders are mostly small.

The average prices of gas-works products during the week were: Gas-works tar, 39s. to 44s. Pitch—East Coast, 55s. to 57s. 6d. f.o.b. West Coast—Manchester, 49s. to 50s.; Liverpool, 51s. 6d. to 52s. 6d.; Clyde, 50s. to 52s. 6d. Toluole, naked, North, 1s. 5d. to 1s. 6d. nominal. Coal-tar crude naphtha, in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 1½d. to 1s. 2d. Heavy naphtha, North, 1s. to 1s. 0½d. Creosote, in bulk, North, liquid, 6½d. to 6¾d.; salty, 6d. to 6½d.; Scotland, 6d. to 6½d. Heavy oils, in bulk, North, 8¼d. to 8½d. Carbolic acid, 60 p.c.t., 2s. 2d. to 2s. 2½d. prompt. Naphthalene, £13 to £15; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.c.t., purely nominal; "B" quality, unsaleable.

Benzole Prices.

The following are considered to be the market prices to-day:

	s. d.	s. d.	
Crude benzole . . .	0 10½	to 0 11	per gallon at works
Motor ,, . . .	1 4½	,, 1 5	,, ,, ,,
90 p.ct. ,, . . .	1 7	,, 1 8	,, ,, ,,
Pure ,, . . .	1 10	,, 1 11	,, ,, ,,

Price Reduced at Braintree and Bocking.—The Directors of the Braintree and Bocking Gas Company, Ltd., announce a decrease of 3d. per 1000 c.ft. of gas to all consumers from the meter readings at June, making the price 5s. 5d. per 1000 c.ft. They have arranged that from the June quarter all consumers shall be given a reduction in price for large quantities, on the following scale: For a quarterly consumption of 25,000 c.ft. and over, 1d. per 1000 c.ft.; 50,000 c.ft. and over, 2d.; and 75,000 c.ft. and over, 3d. They are also instituting a system of inspection of consumers' appliances.

STOCK MARKET REPORT.

DISTURBED conditions continued on the Stock Exchange last week. The raising of American bank rates, and liquidation from both Paris and Brussels, led to a considerable depression of prices. The weakness was mainly confined to the Continental favourites; but the possibility of an increase in our own Bank Rate adversely affected dealings in higher class securities, and naturally the announcement of the big Australian issue accentuated the position. Another large loan to be issued this week is that of the 6½ million 6 p.ct. State of San Paulo.

The passing of the Roads Bill caused a slightly better demand for Home Rails; otherwise there was no outstanding market, and dealers apparently are resigned to subdued holiday conditions.

The business done in the Gas Market was normal for the time of the year. Although the absence of sales on the Stock Exchange tends to keep down the quotations—and in this respect the Portsmouth consolidated stock and 5 p.ct. maximum stock are typical examples—the stocks that are dealt in show material improvements on the prices of a year ago. For example, of the stocks marked up last week, Croydon sliding-scale (now 110-113) was quoted a year ago at 96-99; Gas Light ordinary (now 19s. 3d.-19s. 9d., equalling per £100 96¼-98⅜) was 86½-88½ last year. Maidstone 5 p.ct. is also 5 points higher at 115-120, and there is still room for further improvement.

The following transactions were recorded during the week:

On Monday, Cape Town 4½ p.ct. debenture 73, 74, 74½, Continental Union 33, 7 p.ct. preference 94½, Croydon sliding-scale 111½, European 8½, 8⅝, Gas Light and Coke 18s. 10½d., 18s. 11¼d., 19s. 1½d., 3½ p.ct. maximum 63⅞, 64⅜, 4 p.ct. preference 78½, Imperial Continental 167, 167½, 168, Montevideo 95⅜, 95½, Oriental 116, Primitiva 24s. 9d., 25s., South Metropolitan 106⅝, 107½, 107⅜, 3 p.ct. debenture 61½, South Suburban 5 p.ct. debenture 98⅛, Tottenham "B" 97¼. Supplementary prices, Gas Light and Coke 5 p.ct. debenture 99⅞, 100, Leatherhead 5 p.ct. 10⅝, North Middlesex 5 p.ct. preference 86½, Walton-on-Thames 6 p.ct. preference (new) 108½, 108¾.

On Tuesday, Alliance and Dublin 93½, Bournemouth 5 p.ct. 12 13/16, "B" £12 5s. 9d., 12 7/16, 6 p.ct. preference 10⅞, 4 p.ct. debenture 76½, British 115, 115½, Continental Union 33, 7 p.ct. preference 94½, European 8⅜, 8⅝, Gas Light and Coke 18s. 10½d., 19s., 19s. 1½d., 19s. 3d., 19s. 4½d., 19s. 6d., Imperial Continental 166½, 167, Primitiva 24s. 6d., 24s. 9d., 25s., South Suburban 5 p.ct. debenture 98⅞, Uxbridge 5 p.ct. 91½. Supplementary prices, British, Hull, 3½ p.ct. debentures 63½, British, Norwich, 4 p.ct. debentures 75, Eastbourne 3½ p.ct. "B" 104, Gas Light and Coke 5 p.ct. deb. 99½, 99⅜, 99⅞, 100, Liverpool 5 p.ct. 92.

On Wednesday, Alliance and Dublin 93½, 94½, Bombay 22s. 6d., Bournemouth 6 p.ct. preference 10⅜, Bristol 5 p.ct. 89, British 116, Cape Town 8⅜, European 8⅝, Gas Light and Coke 19s. 4½d., 19s. 6d., 19s. 7½d., 3½ p.ct. maximum 64, 64⅜, 4 p.ct. preference 78½, 3 p.ct. debenture 60¾, Imperial Continental 167, Primitiva 24s. 7½d., 24s. 9d., 25s., South Metropolitan 106¾, 107. Supplementary prices, Gas Light and Coke 5 p.ct. debenture 100, 100½, Walton-on-Thames 6 p.ct. preference (new) 108½.

On Thursday, Alliance and Dublin 94½, Gas Light and Coke 19s. 4½d., 19s. 5½d., 19s. 6d., 19s. 7½d., 4 p.ct. preference 80, 3 p.ct. debenture 60⅞, Imperial Continental 168, Liverpool 7 p.ct. preference 104 13/16, Primitiva 24s. 6d., 24s. 9d., South Metropolitan 107. Supplementary prices, Farnham additional 11 9/16, Gas Light and Coke 5 p.ct. debenture 99¾, 100, 100½, Tottenham 5 p.ct. 98⅞.

On Friday, Croydon sliding-scale 111, Gas Light and Coke 19s. 3d., 19s. 4½d., 19s. 6d., 19s. 7½d., 3½ p.ct. maximum 64⅞, 3 p.ct. debenture 60⅜, 61½, 6 p.ct. Brentford debenture 103½, 5 p.ct. debenture 100½, Imperial Continental 167, 168, Primitiva 24s. 6d., 24s. 7½d., 24s. 9d., 4 p.ct. consolidated debenture 76, South Metropolitan 107, 107⅞, Swansea 6½ p.ct. debenture 101. Supplementary prices, Gas Light and Coke 5 p.ct. debenture 100, 100½, North Middlesex 5 p.ct. preference 90, Romford "B" 9, 9½.

The rise in the New York re-discount rate has had a far-reaching effect. Apart from the consequent fall in the exchange, it has discounted the possibility of a change downward in the home Bank Rate. It is, however, not expected that there will be an increase in the rate owing to the satisfactory gold reserves. At the end of the week money was plentiful in Lombard Street, and balances were offered at under 2½ p.ct. The Treasury Bills were, of course, allotted at a much higher rate, the average being nearly 7s. 3d. p.ct. higher at £4 1s. 3·003d. p.ct.

With China and the Continent selling, Silver declined to 27 3/16d. per oz. Gold remained at 84s. 10½d. per oz.

The Bank Rate is 4½ p.ct., to which it was reduced from 5 p.ct. in April, 1927. The Banks' deposit rate is 2½ p.ct., and the deposit rates of the discount houses are 2½ p.ct. at call and 2¾ p.ct. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. July 18.	Rise or Fall on Week.	Transactions Lowest and Highest Prices.
£			%p.a	% p.a.				
171,978	Stk.	Feb. 9	5	5	Aldershot 5 p.c. max. C.	74—79	..	
412,992	"	"	4	4	Do. 4 p.c. Pref.	69—72	..	..
1,551,868	"	Apl. 12	7	7	Alliance & Dublin Ord.	93—96	..	..
374,000	"	July 12	4	4	Do. 4 p.c. Deb.	68—66*	−1	93⅛—94½
522,654	"	Mar. 8	7	7	Barnet Ord. 7 p.c.	109—112	..	..
800,000	1	Apl. 26	1/7½	1/7½	Bombay, Ltd.	21/—23/-	..	..
170,000	10	Mar. 8	8½	8½	Bournemouth 5 p.c.	12⅛—13⅛	..	22/6
500,050	10	"	7	7	Do. B 7 p.c.	12½—13½	..	12 12/16
375,000	10	"	6	6	Do. Pref. 6 p.c.	10⅛—11	..	12/5/9—12 7/16
50,000	Stk.	July 12	3	3	Do. 5 p.c. Deb.	55—58*	−1	10⅞—10⅞
162,025	"	"	4	4	Do. 4 p.c. Deb.	75—78*	−1	98⅛
857,900	"	Mar. 8	7½	7½	Brighton & Hove 6 p.c. Con.	116—119	..	76½
341,880	"	"	6/8/6⅔	6⅔	Do. 5 p.c. Con.	103—106	..	..
1,287,500	"	Feb. 23	5	5	Bristol 5 p.c. max.	89⅛—90⅛a	..	..
885,000	"	Mar. 22	8	7	British Ord.	113—116	..	..
100,000	"	June 28	7	7	Do. 7 p.c. Pref.	111—114	..	115—116
120,000	"	"	4	4	Do. 4 p.c. Red. Deb.	73—76	..	..
200,000	"	"	5	5	Do. 5 p.c. Red. Deb.	94—97	..	..
100,000	10	May 24	6	8	Cape Town, Ltd.	7⅛—8⅛	..	..
100,000	10	Apl. 26	4½	4½	Do. 4½ p.c. Pref.	6½—7½	..	8⅜
150,000	Stk.	June 28	4½	4½	Do. 4½ p.c. Deb.	70—75	..	..
636,860	"	Feb. 23	6	6	Cardiff Con. Ord.	98—101	..	73—74⅛
237,860	"	June 28	7½	7½	Do. 7½ p.c. Red. Deb.	100—103	..	..
157,150	"	Feb. 23	5	6½	Chester 5 p.c. Ord.	88—93b	..	..
79,185	1	Apl. 26	1/-	1/-	Colombo Ltd. Ord.	31/—33/-	..	..
24,495	1	"	1/4⅜	1/4⅜	Do. 7 p.c. Pref.	20/—22/-	..	..
375,402	1	Apl. 12	1/9½	1/9½	Colonial Gas Assn. Ld. Ord	23/—25/-	..	..
187,848	1	"	1/7½	1/7½	Do. 8 p.c. Pref.	21/—23/-	+1/-	..
2,073,280	Stk.	Feb. 23	5	7	Commercial Ord.	98—101	..	..
475,000	"	June 14	3	3	Do 3 p.c. Deb.	57—60	..	..
800,000	"	Sept. 29	11	11	Continental Union, Ltd.	33—36	..	..
300,000	"	Mar. 8	7	7	Do. 7 p.c. Pref.	90—95	..	33 —
787,560	"	Mar. 8	6½	7	Croydon sliding scale	110—113	+1	94⅛—944
403,100	"	"	5	5	Do. max. div.	84—87	..	111—111½
492,270	"	Mar. 8	7	10	Derby Con.	115—130c	..	..
55,000	"	June 28	4	4	Do. Deb.	71—73c	..	..
209,000	"	Mar. 8	5	5	East Hull Ord. 5 p.c.	76—79	..	..
50,000	"	June 28	5	5	Eastbourne 5 p.c. Deb.	91—96	..	..
1,002,180	10	Mar. 22	†4	†6	European, Ltd.	8—9	..	..
18,703,480	Stk.	Feb. 9	5	5/1/4	Gas Light & Coke 4 p.c. Ord.	19/3—19/9f	+-/6	8⅜—8⅝
2,600,000	"	"	3½	8½	Do. 8½ p.c. max.	63—65	..	18/10½—19/7½
4,167,020	"	"	4	4	Do. 4 p.c. Con. Pref.	78—81	..	63⅜—64⅜
5,603,620	"	June 14	8	8	Do. 3 p.c. Con. Deb.	60—62	..	78½—80
181,815	"	"	6	6	Do. 6 p.c. Br'tf'd Red. Db.	103—106	..	60⅛—61½
1,642,770	"	"	5	5	Do. 5 p.c. Red. Deb.	99—101	+1	103½
42,000	"	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	100½
62,500	"	Mar. 8	6½	6½	Hastings & St L. 5 p.c. Conv	87—90	..	..
258,740	"	"	5½	5½	Do. 5½ p.c. Conv.	68—71	..	..
70,000	10	Apl. 26	†10	†10	Hongkong & China, Ltd.	13⅛—14⅛	..	..
178,200	Stk.	Mar. 8	5	5	Hornsey Con. 3½ p.c.	83—85	..	..
1,976,000	"	May 24	10	10	Imperial Continental Cap.	165—170	+1	166½—169
228,180	"	Feb. 9	8½	8½	Do. 8½ p.c. Red. Deb.	68—70	..	..
295,242	"	Mar. 8	7	7	Lea Bridge 5 p.c. Ord.	94—97	..	..
2,145,907	"	Feb. 23	5½	5½	Liverpool 5 p.c. Ord.	92—93b	..	..
600,000	"	Mar. 22	7	7	Do. 7 p.c. Red. Pref.	102—104b	..	..
165,786	"	Feb. 23	9	8	Maidstone 5 p.c. Cap.	115—120	+2	..
75,000	"	June 14	†8	†8	Malta & Mediterranean	5⅛—5⅞	..	..
541,990	Stk.	May 24	†5	†7	Montevideo, Ltd.	94⅛—96⅛	+⅛	95⅞—95⅛
2,061,315	"	Mar. 8	5	5	Newcastle & Gateshead Con.	16/9—17/3d†	..	..
360,999	"	"	4	4	Do. 4 p.c. Pref.	74⅛—75⅛d	..	..
691,705	"	June 28	8½	8½	Do. 8½ p.c. Deb.	65—66d	..	..
131,780	"	Mar. 8	6/18/0	6/18/0	North Middlesex 6 p.c. Con.	97—100	..	..
800,000	"	Apl. 26	9	7	Oriental, Ltd.	116—121	..	116
188,120	"	June 28	7⅞	7⅞	Plym'th & Ston'house 5 p.c.	105—110	..	..
414,500	"	Feb. 23	7⅛	7⅛	Portsm'th Con. Stk. 4p.c. Std.	101—104	..	..
286,782	"	"	x	5	Do. 5 p.c. max.	77—80	..	..
3,334,464	1	"	5	5	Primitiva Ord.	24/—25/-	−1/-	24/6—25/-
244,500	100	June 1	—	—	Do. 4 p.c. Red. Deb.	91—94	..	..
695,000	Stk.	Jan. 26	4	4	Do. 4 p.c. Red. Deb. 1911	77—79	..	..
416,345	"	June 28	4	4	Do. 4 p.c. Cons. Deb.	75—77	..	..
150,000	10	Mar. 22	4	4	San Paulo 6 p.c. Pref.	8⅞—8⅞	..	76
270,000	Stk.	Mar. 22	6	6	Sheffield A	102—104e	..	..
419,968	"	"	6	6	Do. B	102—104e	..	..
1,047,000	"	"	6	6	Do. C	102—104e	..	..
90,000	10	June 14	6	8	South African	4—6	..	..
6,609,895	Stk.	Feb. 23	5	7½	South Met. Ord.	106—108	..	..
500,000	"	"	—	6	Do. 6 p.c. Irred. Pf.	110—113	..	106⅞—107⅞
1,895,445	"	July 12	8	8	Do. 5 p.c. Deb.	58—61*	−1	..
784,000	"	Mar. 8	6½	6½	Do. 6½ p.c. Red. Db.	100—102	..	61½
91,500	"	Feb. 23	8½	8½	South Shields Con.	112—113d	..	..
1,243,795	"	Feb. 23	6½	8½	South Suburban Ord. 5 p.c.	105—108	..	..
868,837	"	June 28	5	5	Do. 5 p.c. Deb.	96—99	..	..
647,740	"	Mar. 22	5	5	South'mpton Ord. 5 p.c. max.	78—80	..	98⅞—98⅞
121,275	"	June 28	4	4	Do. 4 p.c. Deb.	72—75	..	..
350,000	"	Mar. 8	7	7	Swansea 7 p.c. Red. Pref.	100—103	..	..
300,000	"	June 28	6½	6½	Do. 6½ p.c. Red. Deb.	99—102	..	..
120,000	"	Feb. 23	7⅛	7⅛	Tottenham District A 5 p.c.	117—122	..	101
882,275	"	"	6½	6½	Do. B 3½ p.c.	95—98	..	..
150,000	"	"	5½	5½	Do. 5½ p.c. Pref.	98—101	..	97½
181,256	"	June 14	4	4	Do. 4 p.c. Deb.	76—79	..	..
280,094	"	Mar. 8	6½	6 5/16	Uxbridge, Maidenhead, & Wycombe 5 p.c.	90—95	..	..
98,880	"	"	5	5	Do. 5 p.c. pref.	86—90	..	91½
80,000	"	July 12	8½	8½	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	126—129*	−4	..
265,836	"	"	7	7½	Do. B 3½ p.c.	108—118*	−3	..
482,585	"	"	5/19/0	6½	Do. C and New	96—101*	−3	..
352,000	"	"	6⅝	6⅝	Do. Wimbledon 5 p.c.	104—104*	−2	..
98,000	"	"	7½	7½	Do. Epsom 5 p.c.	110—115*	−2	..
200,000	"	"	5	5	Do. 5 p.c. Pref	85—88*	−2	..
88,416	"	June 28	3	3	Do. 3 p.c. Deb.	56—59	−2	..
284,743	"	"	4	4	Do. 4 p.c. Deb.	75—78	..	..

Quotations at:—a.—Bristol. b.—Liverpool. c.—Nottingham. d.—Newcastle. e.—Sheffield. f.—The quotation is per £1 of Stock. * Ex. div. † Paid free of income-tax. ‡ For year.

CONTRACTS OPEN.

Gasholder.

The Ilkeston Gas Department invite tenders for the erection of a gasholder in existing tank. [See advert. on p. 164.]

TRADE NOTES.

Purifiers for Inverness.

The Inverness Corporation have placed an order with Messrs. Robert Dempster & Sons, Ltd., Rose Mount Iron Works, Elland, for four purifiers 30 ft. by 20 ft. by 5 ft. 6 in. deep, with connectionless centre valve; the whole being erected on steel superstructure with overhead oxide floor and oxide elevator.

Doncaster Coalite, Ltd., has been registered as a public company, to acquire interests in any invention relating to the carbonization of coal. The nominal capital is £31,000 in £1 shares (30,000 preference and 1000 ordinary); and the offices are at 3-4, Clement's Inn, Strand, W.C. 2.

Parkinson and W. & B. Cowan, Ltd.—The London and Yorkshire Trust, Ltd., announces that the recent issue to shareholders of 50,000 7 p.ct. cumulative preference shares of £1 each, and 100,000 ordinary shares of £1 each, in the capital of Messrs. Parkinson and W. & B. Cowan, Ltd., has been over-subscribed, and letters of allotment have been posted. The basis of allotment was approximately one-third of the number of shares applied for.

Aberfeldy Gas Light Company Dividend.—At the annual general meeting of the shareholders of the Aberfeldy Gas Light Company, held in the Bank of Scotland Buildings—Provost Haggart presiding—it was reported that the past year's working had given good results; and the balance-sheet up to April 31 last, submitted by Mr. John Fergusson, the Secretary, was considered very satisfactory. A dividend of 5 p.ct. on the ordinary shares was agreed to be paid, and a substantial sum was carried forward to the reserve fund.

Increased Sales at Rotherham.—In his annual report on the working of the Rotherham Corporation Gas Department for the year ended March 31, Mr. T. R. Cook, the Engineer and General Manager, states that the quantity of gas purchased was 403,530,000 c.ft., as against 368,776,000 c.ft., made and purchased last year—an increase of 34,750,000 c.ft. The quantity of gas sold was 376 million c.ft. compared with 338 millions—an increase of 11·09 p.ct. The gross profit was £27,333, as against £3861 in 1926-27; and the net profit was £15,891, subject to provision for income-tax outstanding, compared with a loss in 1926-27 of £11,227. During the year new records have been made. The amount of gas sold is more than in any other year in the history of the Department, and the gross, net, and surplus profits are also in excess of any previous year.

Hereford Gas Department.—Presenting the annual report and financial statement of the Gas Department of the Hereford Corporation at a meeting of the City Council last week, Alderman Witts pointed out that the balance on the profit and loss account during the year ended March 25 amounted to £7530, and in addition to this they had placed £700 to the working capital account. After adding sundry receipts, and deducting the interest payable on loans, they were left with £5780. They took this balance to the revenue account; and after deducting the amount required for repayment of loans, they had £2362 to carry to the net revenue account, giving a total of £5805. Coal last year cost them £8000 less than in the preceding year; and this saving was disposed of by a sixpenny reduction in the price of gas, which cost the Committee during the year £5000. Eight years ago the gas sold amounted to 160 million c.ft. Since then there had been a 25 p.ct. increase.

Reconstruction Work at Bradford.—At a meeting of the Bradford Gas Committee on July 13, Mr. E. J. Sutcliffe, the Gas Engineer and General Manager, gave details of the preparations now in hand for extending the gas-works plant and modernizing such parts as need bringing up to date. The Birkshall Works, which already have the city's most modern vertical retort plant, are to be extended by further silica retorts, and purifiers to deal with the whole output of that works, at an estimated cost of £80,000. The retort house at the Valley Road Works is to be modernized, and a carburetted water-gas plant erected. When the Valley Road reconstruction is complete, the Mill Street Works will be closed, and the site used for new meter, lamp, and stove repairing shops, and as a centre for the mains department. At Mill Street, a new holder is being built in the pit which formerly held Bradford's oldest gasholder. In the overhauling of one of the holders at the Valley Road Works, a bottle was found in the water, bearing a description of the holder and dated 43 years ago.

Allocation of Gas Profits at Yeovil.—A proposal regarding the allocation of the profits of municipal trading came under discussion at a meeting of the Yeovil Town Council on July 10. It arose out of a recommendation by the Finance Committee that it should be the settled policy of the Council that leading trading undertakings should contribute towards the relief of the rates each year a certain proportion of their net profits, and that in future any recommendation of the Gas or Water Committees advising an alteration in the selling prices of either of those commodities should state whether, in the opinion of the Committee concerned, such alteration would affect any future contributions towards the relief of the rates. It was pointed out by Alderman H. E. Higdon that, so far as the gas undertaking was concerned, the resolution meant that £1300 would go to the relief of the rates, and that 2d. per 1000 c.ft. would be lost to the consumers of gas, many of whom were people of limited means. Alderman Pittard contended that it would be unfair that people who did not use a product should obtain reduced rates through those who did use it. After discussion, an amendment was carried by a large majority referring the matter back.

Pontypridd's Increased Sales.

At the last meeting of the Gas Committee of the Pontypridd Urban District Council, Mr. David Muir (the Engineer and Manager) reported that the result of the working for the year ended March 31, 1928, showed a gross profit of £11,351, and a net profit of £4533. Gas sales increased by 13,888,655 c.ft., or 12·6 p.ct. Additional consumers to the number of 211 were connected to the mains, and 227 extra cookers were in use. It was decided to put the following scale of prices into operation:

C.Ft. per Quarter.	d. per Therm.
Up to 2,500	11·3
From 2,500 to 12,500	11·08
From 12,500 to 25,000	10·87
From 25,000 to 50,000	10·66
From 50,000 to 75,000	10·45
From 75,000 to 100,000	10 23
From 100,000 to 125,000	10·0
From 125,000 to 150,000	9 78
Over 150,000	9·56

The price of gas at Kirkcaldy has been reduced from 4s. 9d. to 4s. 3d. per 1000 c.ft.

The Abertillery Gas Department contributed £2792 to the relief of rates during the year ended March 31 last.

The Bradford Corporation Gas Committee have given permission to the Gas Department to take part in an Ideal Homes Exhibition which is to be held in Bradford from April 2-13, 1929.

The fusing of an electric wire was the cause of an outbreak of fire, last week, at the drapery shop of Mrs. H. Musther, Northgate, Halifax; and damage was done to the extent of about £500.

The Yeovil Town Council, at a meeting on July 10, adopted a recommendation that the price of gas be reduced from 10d. to 9d. per therm, or 4s. to 3s. 7·2d. per 1000 c.ft., as from July 1.

Under the auspices of the Droitwich Corporation Gas Department, and the supervision of the Gas Engineer, Mr. C. C. Sidaway, an exhibition of gas appliances for heating, cooking, and lighting was held last week.

The Long Sutton (Lincolnshire) Gas Company's report for the past year states that, in view of exceptional expenditure in building a new gasholder and laying down new retorts, no dividend is recommended for the past year. The price of gas has been reduced.

The Helston (Cornwall) Town Council met on Wednesday last to consider tenders in connection with a new gasholder and foundation. It was decided to accept a tender for a loan to the Corporation of £4250 for the holder and foundation, and also for improvements to the gas showroom, &c., at 5 p.ct. interest, with an additional 15s. p.ct. interest to cover expenses.

The fusing of an electric wire in the colour room at the dye-works of Messrs. J. R. Denison & Co., Ltd., Bradford, on July 13, caused fire and explosion among barrels of chemicals. The Fire Brigade had control of the outbreak—though there was a considerable blaze—before the flames were able to reach a store of chemicals in upper rooms, which, had it caught fire, would probably have wrecked the building.

The Oswestry Gas Company are developing the works at a cost of between £10,000 and £15,000, and reducing the charges from 5s. 5d. to 5s. per 1000 c.ft., allowing from 7½ to 25 p.ct. discount according to consumption. Prepayment meters will be set at 15 instead of 14 c.ft. per penny, and shilling slot meters will receive a corresponding allowance. There will be a bonus on all prepayment meters of 10 p.ct., paid half yearly.

A mummified mouse was found recently in an iron gas supply pipe at offices in Cannon Street, Birmingham, by workmen from the Gas Department sent to renew the pipe. The mouse was in a state of perfect preservation, even its whiskers being intact. As the pipe, which is of an inch-and-a-half diameter, had not been disturbed for thirty years, it is certain that the little creature crept into it when the premises were being erected. A connection was then made to the meter, and the coal gas sealed the mouse's fate, and at the same time saved the body from the decaying effects of the atmosphere. Such a discovery is so rare that the mummified mouse has been placed in a specially blown glass tube for the Gas Department's museum.

Messrs. Robert Cort & Son's employees had their annual outing on Tuesday, the 3rd inst., when they spent an enjoyable day at Brighton. Luncheon was served at Messrs. Booth's Restaurant, where the Managing Director (Mr. A. G. Sims) and Mrs. Sims joined the party. After the toast of "The King" had been honoured, Mr. A. C. Badger (Social Secretary) addressed the company, and at the close of his remarks asked Mr. Sims to accept a silver flask (which had been subscribed for by the employees) as a token of their great respect for him. Mrs. Sims was also asked to accept a small gift as a mark of appreciation of her presence among them. The presentations were made by Mr. Jack Cowen, the oldest employee, who has been in the service of the firm for over 50 years. Mr. Sims, in responding, expressed his pleasure at seeing the increased number present, and remarked that during the past year the business of the Company had continued to expand. In fact, over one-third more work had been produced than in the previous year. It gave him great satisfaction to know that his firm continued from year to year to give employment to gradually increasing numbers.